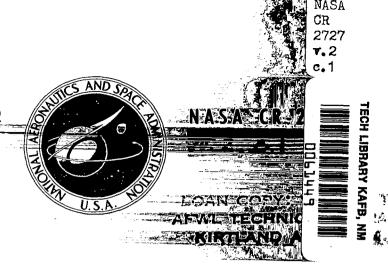
NASA CONTRACTOR REPORT



ANALYSIS OF STRUCTURAL DYNAMIC DATA FROM SKYLAB

Volume II - Skylab Analytical and Test Modal Data

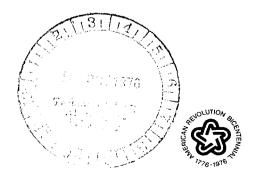
Leonard Demchak and Harry Harcrow

Prepared by

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Denver, Co. 80201

for George C. Marshall Space Flight Center



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This volume is a compendium of the orbital configuration test modal data, analytical test modal data, analytical test correlation modal data and analytical flight configuration 1.2 modal data. Section A presents tables showing the generalized mass contributions (GMC's) for each of the thirty test modes. Section B presents the two-dimensional mode shape plots for the thirty test modes. Tables of GMC's for the test correlated analytical modes are presented in Section C. These analytical modes were generated from a model that was adjusted to match test results by use of the methodology discussed in Sections 2.3 and 5.4 of Volume I of this report. Section D presents the two-dimensional mode shape plots for the analytical modes. Sections E and F contain the uncoupled and coupled modes of the orbital flight configuration 1.2 at three development phases of the model. These phases of the model—initial, pretest, and final—are described in detail in Section 1 of Volume I of this report. This analysis is published in two volumes: Volume I - Technical Discussion - NASA CR-2727 Volume II - Skylab Analytical and Test Modal Data - NASA CR-2728						
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SECTION A

Test Modes GMC Tables

The following Tables A-1 through A-60 show the generalized mass contributions (GMC's) for each of the thirty test modes. Two types of tables are given for each mode. The first table gives a summary of GMC's for major structural components while the second table shows the GMC for each of the 193 degrees of freedom contained in the reduced test data. These GMC data were calculated using a 193 x 193 discrete mass matrix derived using static collapse of analytical component mass matrices. It should be noted that the GMC distribution shown for Mode 02A is highly distorted due to apparent bad accelerometer data for the AFT OWS Skirt station 3100.

TABLE A-1 ORBITAL CONFIGURATION MODAL SURVEY

TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 014	TEST FREQUENCY = .31 HZ.					
C OM PONE NT NA ME	GMC {IDX}	GMC (DY)	GM C {D 7}	GMC (TX)	GMC (TY)	GMC (TZ)
BR/OWS SKIRT/IU/FAS	. P0 6 C	.0313	. 20 69	.0001	.0036	.0086
5-FAS 02 TANKS MDA/STS/AM	.0019	• 13 26 • 13 22	•1123 •1385	0. .0002	0. .3923	3.
6-AM N2 TANKS COMMAND/SERVICE MOD. DEPLOYMENT ASSEMBLY	.0002 .0003 .0001	.0305 .0065 .0317	.0228 .2541 .0237	0. .0003 6.	9. 0001	0. .0001
ATM-RACK, CMGS, 4-SAS ATM-SPAR CENTER	.0014	.3327	.1335	.0001	.0334	.6000
ATM-GRAZCAN CENTER	.0731	.0000	• 32 43	•£333.		.0001
SUM	.0106	.3171	. 9559	.[][9	. 1062	.0392

RR/OWS SKIRT/IU/FAS	. 2255
6-FAS DZ TANKS	.1157
MDA/STS/AM	.1439
6-AM NZ TAMKS	.0235
COHMAND/SERVICE MOD.	·2713
DEPLOYMENT ASSEMBLY	.0245
ATH-RACK, CMGS, 4-SAS	.1381
ATM-SPAR CENTER	.0306
ATM-GRA/CAM CENTER	.0248

A-5
TABLE A-2 GENTRALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

TEST MODE DIA RUN NO. 333 FREQUENCY = .31

NORE GMC (NY) (NY) (07) (07) (TX) (TY) (TZ) DESCRIPTION 1		, _ , .	*** ***	di A		,,,,,	I KENOET	461 = \$31
NO. (DY) (DY) (OZ) (TX) (TY) (TZ) DESCRIPTION 1								
1 .00550001 .0869 .0001 .0030 .0086 BASE RNG/JMS SKIRT 2 .0001 .0002 .0209 .00000006 .0000 CMS/TU INTERFACE 30001 .0010 .0174 .0.								
3	AD.	(13X)	(OY)	(07)	(TX)	(14)	(12)	DESCRIPTION
3	1	. 0.055	0001	. 0869	. 0 0 0 1	- በባፕበ	.0086	RASE PAGANES SKIPT
					. 2222	0006	40000	
## .0001 .0010 .0174 0. 0. 0. FAS OZ 90TL1.*Y * Z								
F .0096 .0004 .0246 0. 0. FAS 02 90TL2.YY +Z 7 .0001 .0004 .0246 0. 0. 0. 0. FAS 02 90TL3.YY +Z 7 .0001 .0004 .0239 0. 0. 0. FAS 02 90TL4.YY +Z 9 .0001 .0003 .0039 0. 0. 0. FAS 02 90TL4.YY +Z 10 .0001 .0003 .0039 0. 0. FAS 02 90TL5.YY -Z 11 .0004 .0005 .0008 0. 0. FAS 02 90TL5.YY -Z 11 .0004 .0005 .0008 0. 0. 0. FAS/AM/DA IF, +Y 120001 .0002 .0107 0. 0. FAS/AM/DA IF, +Y 130009 .0000 .0033 0. 0. 0. FAS/AM/DA IF, -Y 14 .0000 .0000 .0011 0. 0. FAS/AM/DA IF, -Y 15 .0000 .0000 .0011 0. 0. FAS/AM/DA IF, -Y 16 .0002 .0000 .0011 0. 0. FAS/AM/DA IF, -Y 17 .0002 .0000 .0011 0. 0. FAS/AM/DA IF, -Y 18 .0002 .0000 .0011 0. 0. FAS/AM/DA IF, -Y 19 .0002 .0000 .0011 0. 0. FAS/AM/DA IF, -Y 19 .0002 .0000 .0011 0. 0. FAS/AM/DA IF, -Y 19 .0002 .0000 .0011 0. 0. FAS/AM/DA IF, -Y 19 .0002 .0000 .0011 0. 0. FAS/AM/DA IF, -Y 19 .0002 .0000 .0011 0. 0. FAS/AM/DA IF, -Y 19 .0002 .0000 .0011 0. 0. FAS/AM/DA IF, -Y 19 .0002 .0000 .0011 0. 0. 0. FAS/AM/DA IF, -Y 19 .0002 .0003 .0168 .0001 .0002 .0003 AM TUNNEL/STER IF 19 .0000 .0000 .0018 .0000 .0019 .0000 MAPTINEL/SHEAR MB 19 .0000 .0001 .0045 0. 0. 0. NZ TANK, +Y, LOMEP 20 .0001 .0001 .0045 0. 0. NZ TANK, +Y, LOMEP 21 .0001 .0001 .0045 0. 0. NZ TANK, +Y, LOMEP 22 .0001 .0001 .0045 0. 0. NZ TANK, +Y, LOMEP 23 .0002 .0001 .0043 0. 0. 0. NZ TANK, +Y, LOMEP 24 .0001 .0001 .0045 0. 0. NZ TANK, +Y, LOMEP 25 .0002 .0001 .0043 0. 0. 0. NZ TANK, +Y, LOMEP 26 .0002 .0001 .0043 0. 0. 0. NZ TANK, +Y, LOMEP 27 .0002 .0001 .0043 0. 0. 0. NZ TANK, +Y, LOMEP 28 .0001 .0001 .0045 0. 0. 0. NZ TANK, +Z, UPPER 29 .0001 .0001 .0046 0. 0. 0. NZ TANK, +Z, UPPER 20 .0001 .0001 .0046 0. 0. 0. NZ TANK, +Z, UPPER 21 .0001 .0001 .0046 0. 0. 0. NZ TANK, +Z, UPPER 22 .0001 .0000 .0047 0. 0. 0. NZ TANK, +Z, UPPER 23 .0000 .0000 .0047 0. 0. 0. NZ TANK, +Z, UPPER 24 .0001 .0001 .0025 0. 0. 0. NZ TANK, +Z, UPPER 25 .0002 .0000 .0047 0. 0. 0. NZ TANK, +Z, UPPER 26 .0000 .0001 .0046 0. 0. 0. NZ TANK, +Z, UPPER 27 .0001 .0002 .0005 0. 0. 0. NZ TANK, +Z, UPPER 28 .0000 .0000 .0047 0. 0. 0. NZ TANK, +Z, UPPER 29 .0000	4							
7		• 0006	• 0004	.0264	0 •	9.	0.	
9 1001 0003 0031 0162 0 0 0 FAS 02 90TL5; -Y -Z 10 1000 0001 0162 0 0 0 0 FAS 02 90TL5; -Y -Z 11 10004 0005 0098 0 0 0 FAS/AM/DA IF; +Y 11 10004 0005 0098 0 0 0 FAS/AM/DA IF; +Y 12 -1090 0002 0107 0 0 0 FAS/AM/DA IF; -Y -Z 13 -0000 0000 0033 0 0 0 FAS/AM/DA IF; -Y -Z 14 1000 0000 0051 0 0 0 FAS/AM/DA IF; -Y -Z 15 1000 0000 0051 0 0 0 FAS/AM/DA IF; -Y -Z 15 1000 0000 0011 0 0 0 0 FAS/AM/DA IF; -Y -Z 15 1000 0000 0011 0 0 0 0 FAS/AM/DA IF; -Y -Z 15 1000 0000 0011 0 0 0 0 0 FAS/AM/DA IF; -Y -Z 15 1000 0000 0011 0 0 0 0 0 FAS/AM/DA IF; -Y -Z 15 1000 0000 0010 0010 0 0 0 0 0 0 0 0 0		.0017			9.	_		
10					-			
11								
11								
12 -0.000								
13	_				-			
14								
15								
15								
17								
19	17	• ၁၈၁၁	.0008	.0180	• 0003	.0001	.0000	AM TUNNEL/STS IF
27 .0000 .0001 .0038 0. 0. 0. N2 TANK, +Y, LOHEP 21 .0001 .0001 .0045 0. 0. 0. N2 TANK, +Y, LOHEP 22 .0001 .0001 .0040 0. 0. N2 TANK, +Z, LOHER 23 .0000 .0001 .0040 0. 0. N2 TANK, +Z, LOHER 24 .0000 .0001 .0036 0. 0. N2 TANK, +Z, LOHER 25 .0000 .0000 .0043 0. 0. N2 TANK, -Z, LOHER 26 .0000 .0000 .0043 0. 0. N2 TANK, -Z, LOHER 27 .0002 .0030 .0836 -0000 -0000 .0000 CM, AFT 3JLKHEAD 28 .0001 .0013 .0592 .0000 -0000 .0000 CM, AFT 3JLKHEAD 29 .0001 .0013 .0592 .0003 -0000 .0001 SM, FAD 3JLKHEAD 29 .0001 .0014 .0743 .0001 -0000 -0000 SM, FAD 3JLKHEAD 29 .0001 .0014 .0743 .0001 -0000 -0000 SM, FAD 3JLKHEAD 29 .0001 .0002 .0035 0. 0. 0. LOHER T TRUNNION 31 .00001 .0002 .0035 0. 0. 0. LOHER T TRUNNION 32 -00001 .0002 .0035 0. 0. 0. LOHER T TRUNNION 33 .0000 .0001 .0025 0. 0. 0. LOHER T TRUNNION 33 .0000 .0001 .0025 0. 0. 0. EREP PACKAGE C.G. 34 .0002 .0001 .0118 0. 0. 0. TAM PN 5,7 IF,OUTR 36 .0000 .0001 .0160 0. 0. 0. ATM PN 4,5 IF,OUTR 37 .0004 .0005 .0163 0. 0. 0. ATM PN 3,1 IF,OUTR 38 .0000 .0001 .0167 0. 0. 0. ATM PN 4,5 IF,INNR 40 .0002 .0006 .0065 0. 0. 0. ATM PN 2,3 IF,OUTR 41 .0001 .0004 .0122 0. 0. ATM PN 2,3 IF,OUTR 42 -0000 .0004 .0122 0. 0. ATM PN 2,3 IF,INNR 40 .0000 .0004 .0122 0. 0. ATM PN 2,3 IF,INNR 41 .0001 .0004 .0122 0. 0. ATM PN 2,3 IF,INNR 42 -0000 .0004 .0122 0. 0. ATM PN 2,3 IF,INNR 40 .0000 .0004 .0122 0. 0. ATM PN 2,3 IF,INNR 41 .0001 .0004 .0122 0. 0. ATM PN 2,3 IF,INNR 42 -0000 .0004 .0122 0. 0. ATM PN 3,1 IF,INNR 43 .0000 .0001 .0007 .0007 .0000 .0000 CMG, +X SIDE 44 .0001 .0000 .0007 .0000 .0007 .0000 CMG, +X SIDE 45 -0000 .0000 .0007 .0000 .0000 .0000 CMG, +X SIDE 46 .0000 .0000 .0000 .0000 .0000 .0000 SPAP CENTER 50 .0001 .0001 .0000 .0000 .0000 .0000 CMG, +X SIDE 47 .0001 .0000 .0000 .0000 .0000 .0000 CMG, +X SIDE 48 .0000 .0000 .0000 .0000 .0000 .0000 CMG, +X SIDE 49 .0002 .0005 .0000 .0000 .0000 .0000 CMG, +X SIDE 40 .0000 .0000 .0000 .0000 .0000 .0000 CMG, +X SIDE 40 .0000 .0000 .0000 .0000 .0000 .0000 .0000 CMG, +X SIDE 40 .0000 .0000 .0000 .0000 .0000 .0000 .0000 CMG, +X SIDE 40 .		.0700	• 0009		.0000	.0019	•0000	MDA/STS INTERFACE
21								
27								
27					-			
24	_							
25 .0000 .0000 .004700000000 .0000 CM, FAJD GULKHEAD .0001 .0001 .0000 CM, FAJD GULKHEAD .0001 .0001 .0000 CM, FAJD GULKHEAD .0001 .0001 SM, FAJD GULKHEAD .0001 .0001 SM, FAJD GULKHEAD .0001 .0001 SM, FAJD GULKHEAD .0001 .0001 .0001 SM, FAJD GULKHEAD .0001 .0001 .0002 .0001 .0000 CM, AFT GULKHEAD .0001 .0001 .0002 .0001 .0000 SM, FAJD GULKHEAD .0001 .0001 .0002 .0001 .0000 SM, AFT GULKHEAD .0001 .0001 .0002 .0001 .0000 SM, AFT GULKHEAD .0001 .0001 .0002 .0001 .000							0 .	
25	-							
29	_					0000	• 0000	CM. EAD BUIKHEAD
29						0001	.0000	CM. AFT BULKHEAD
29 .0000 .0014 .0743 .900100000000 SM, AFT BULKHEAD 70 .0001 .0002 .0035 0.	29						.0001	SM, FAD BULKHEAD
31	29	. 0000	.0014		. 3001	0000		SM, AFT BULKHEAD
7200000001 .0106 0. 0. 0. LOHER -Y TRUNNION 73 .0000 .0001 .0025 0. 0. 0. FREP PACKAGE C.G. 74 .00020001 .0283 0. 0. 0. ATM PN 5,7 IF, OUTR 75 .00090001 .0118 0. 0. 0. ATM PN 5,7 IF, OUTR 76 .0000 .0001 .0160 0. 0. 0. ATM PN 3,1 IF, OUTR 77 .0004 .0005 .0163 0. 0. 0. ATM PN 2,3 IF, OUTR 780000 .0009 .0167 0. 0. 0. ATM PN 2,3 IF, INNR 790002 .0006 .0066 0. 0. 0. ATM PN 4,5 IF, INNR 70 .0002 .0006 .0066 0. 0. ATM PN 4,5 IF, INNR 70 .0001 .0004 .0154 0. 0. 0. ATM PN 8,1 IF, INNR 70 .0001 .0004 .0154 0. 0. 0. ATM PN 2,3 IF, INNR 70 .0000 .0001 .0004 .0154 0. 0. 0. ATM PN 2,3 IF, INNR 70 .0000 .0001 .0004 .0007 .0000 .0000 .0000 CMG, -Y SIDE 70 .0000 .0000 0. 0. 0. 0. 0. ATM SAS, PN 1 71 .0001 .0000 .00030000 .0004 .0000 CMG, +Y SIDE 71 .0000 .0000 0. 0. 0. 0. 0. ATM SAS, PN 3 72 .0000 .0000 0. 0. 0. 0. ATM SAS, PN 3 73 .0000 .0000 0. 0. 0. 0. 0. ATM SAS, PN 3 74 .0001 .0001 0. 0. 0. 0. 0. ATM SAS, PN 5 75 .0001 .0000 .0243 .0000 .0000 .0001 GRAZCAN CENTER	-							
33						-		
34	-							
35								ATM DU 6 7 TE OUT
36								
37	-							
380000 .0009 .0167 J. 0. 0. ATM PN 6,7 IF, INNR 390002 .0006 .0065 0. 0. 0. ATM PN 4,5 IF, INNR 40 .0000 .0004 .0122 0. 0. 0. ATM PN 8,1 IF, INNR 41 .0001 .0004 .6154 0. 0. 0. ATM PN 2,3 IF, INNR 420000 .0000 .0047 .0000 .0000 .0000 .000 .								ATM PN 2.3 TF. OUTP
390002 .0006 .0065 0. 0. 0. ATM PN 4,5 IF, INNR 40 .0000 .0004 .0122 0. 0. 0. ATM PN 8,1 IF, INNR 41 .0001 .0004 .6154 0. 0. 0. ATM PN 2,3 IF, INNR 420000 .0000 .0047 .0000 .0000 .0000 CMG, -Y SIDE 43 .0000 .0001 .0047 .000000000000 CMG, +Y SIDE 44 .00010000 .00030000 .0004 .0000 CMG, +X SIDE 4500000000 0. 0. 0. 0. ATM SAS, PN 1 46 .0000 .0000 0. 0. 0. 0. ATM SAS, PN 3 47 .0001 .0001 0. 0. 0. 0. 0. ATM SAS, PN 5 4800000000 0. 0. 0. 0. 0. ATM SAS, PN 7 49 .0002 .0005 .0298 .0000 .0000 .0001 GRAZCAN CENTER 50 .0001 .0000 .0243 .0003 .0000 .0001 GRAZCAN CENTER	38							
41	39				_	_		
420030 .0000 .0047 .0000 .0000 .0000 CMG, -Y SIDE 43 .0000 .0001 .0047 .00000000 CMG, +Y SIDE 44 .00310000 .00030000 .0004 .0000 CMG, +X SIDE 4500000000 0.	40		• 0004		8.	0 •	0.	
43						O •	0 •	
44 .00010000 .00080000 .0004 .0000 CMG, +X SIDE 4500000000 0.								
4500000000 0. 0. 0. 0. ATM SAS, PN 1 46 .0000 .0000 0. 0. 0. 0. 0. ATM SAS, PN 3 47 .0001 .0001 0. 0. 0. 0. 3. ATM SAS, PN 5 4800000000 0. 0. 0. 0. ATM SAS, PN 7 49 .0002 .0005 .0298 .0000 .0000 .0002 SPAR CENTER 50 .0001 .0000 .0243 .0003 .0000 .0001 GRAZCAN CENTER								
46 .0000 .0000 0. 0. 0. 0. 0. ATM SAS, PN 3 47 .0001 .0001 0. 0. 0. 0. 3. ATM SAS, PN 5 4800000000 0. 0. 0. 0. ATM SAS, PN 7 49 .0002 .0005 .0298 .0000 .0000 .0002 SPAR DENTER 50 .0001 .0000 .0243 .0003 .0000 .0001 GRAZCAN CENTER								
47 .0001 .0001 0. 0. 0. 0. 0. ATM SAS, PN 5 4800000000 0. 0. 0. 0. ATM SAS, PN 7 49 .0002 .0005 .0298 .0000 .0000 .0002 SPAR CENTER 50 .0001 .0000 .0243 .0003 .0000 .0001 GRAZCAN CENTER				_	_	_		
49 -0000 -0000 0. 0. 0. 0. ATM SAS, PN 7 49 .0002 .0005 .0298 .0000 .0000 .0002 SPAR CENTER 50 .0001 .0000 .0243 .0003 .0000 .0001 GRAZCAN CENTER								
49 .0002 .0005 .0298 .0000 .0000 .0002 SPAR CENTER 50 .0001 .0000 .0243 .0003 .0000 .0001 GRAZCAN CENTER				_	_			
50 .0001 .0000 .0243 .0003 .0000 .0001 GRAZCAN CENTER								
	= 0							
SUM .0106 .0171 .9559 .0009 .0062 .0094								
	2 NW	. 2105	.9171	• 955 9	.0009	• 0 0 6 2	.009	4

TABLE A-3 ORBITAL CONFIGURATION MODAL SURVEY

TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. C2	TEST FREQUENCY = .31 HZ.					
COMPONENT	GĦ C	GMC	GMC	GMC	GMC	GM C
NAME	(DX)	(YC)	(DZ)	(TX)	(TY)	(TZ)
BR/OWS SKIRT/IU/FAS	.2014	• 1318	. 39 30	saco.	.1701	•1036
6-FAS 02 TANKS	.0004	• ^31G	.0009	C •	0.	O.
MDA/STS/AM	.0000	.0418	. 03 01	0101	. 5000	.0884
6-AM NO TANKS	.0000	. 3374	.0001	G •	G •	0 •
COMMAND/SERVICE MOD.	.0001	. 3525	. 03 42	.0911		.0000
DEPLOYMENT ASSEMBLY	.0003	• 3056	.9991	6 •	3 •	0.
ATM-RACK, CMGS, 4-SAS	.0005	· 0351	• 00 06	.000	.0000	.0000
ATM-SPAR CENTER	.0008	. 89 94	.0704	0300	.0000	J •
ATM-GRAZCAN CENTER	.0000	.3374	•0003	.0000	.0000	.6000
SUM	. 20 27	• 22 19	• 39 9£	.0318	.6782	.1040

BR/OWS SKIRT/IU/FAS	.8007
6-FAS 02 TANKS	.0323
MDA/STS/AM	.0422
S-AM N2 TAMKS	.0076
COMMAND/SERVICE MOD.	.0576
DEPLOYMENT ASSEMBLY	.0060
ATM-RACK, CMGS, 4-SAS	.0362
ATM-SPAR CENTER	.0698
ATM-GRA/CAN CENTER	.0077

TABLE A-4 GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

	1591	MODE	02 A	RUN NO.	336	FREQUEN	1CY =	. 31
₩095 ₩9•	GM0 (DX)	GMC (DY)	6MC (DZ)	GMC (TX)		GMC (TZ)		NODE CRIPTION
1	.2911		. 3928	.0007				S/OWS SKIRT
2	1 ^ 0 0	.0056	0001		• 00 00			NTERFACE
3	.0000	.0184	.0002	.0001	• 3000			INTERFACE
4 5	.0000	0042	.0004	0.	G.	0.		30TL1,+Y +Z
ė,	.0091 .0000	.0051 .0057	0000 -0002	0.	0.	0 • 0 •		30TL2,+Y +Z 30TL3,-Y +Z
7	.9003	•0054	.0002	0.	0.	3 •		30TL4,-Y +Z
8	0000	.0058	.0000	0.	0	0.		30165,-Y -Z
ä	0000		.0301	j.	0.	0.		BOTLS,-Y -Z
10	.0001	.0019	6000	9.	0.	0.		04 IF, +Y
11	.0001	.0027	0000	0.	0.	0.	FAS/A4/!	74 IF, +Z
12	0003	.0029	.0001	0 •	0 •	0 •	FAS/AM/	DA IF, -Y
1 3	0000	.0003	0000	0.	0.	0.	FAS/DA	I=, -Y -Z
4 4	• 0000	.0018	• 6000	ŋ .	9•	3.	FAS/AM	IF, -Z
15	• 2000	.0003	0000	0.	0.	0.		IF, +Y -Z
16	.0000				•0000			EL/SHEAR WB
17	.0000	.0088	.0000 0003	.0000 0001	.0000			EL/STS IF
18 19	.0000 .0000	.0147 .0143	• 0001	0000	.0000 0000	.0001		INTERFACE E/CYL ITRFC
20	.7300	.0003	.0000	J•	0.	0.		, +Y, LOWER
?1	0300	.0010	.0000	0.	0.	0.		, FY, JPPER
22	• 0 0 0 3 3	.0011	.0001	0.	3.	0.		+Z, LOHER
23	.0003	.0119	.0000	0.	0 •	0 •		, +Z, UPPER
24	.0000	.0013	• 6000	0•	0.	0.	N2 TANK	
25	• 0 0 0 0	.0012	.0000	0.	0.	0.		, -Z, UPPER
25 27	0000	.0094		.0007	.0000			RJL KHEAD
2 9	0000 .0000	.0142 .0101	.0000 .0001	.0032 .0002	.0000 0000	0000	•	BULKHEAD BULKHEAD
20	.0001	.0188	• 0030	.0000	• 0000	.0000		BULKHEAD
- 7)	.0000	.0342	.0000	3.	9.	0.		LATCH, DA
31	.0002	.0003	.0001	3 •	6 •	0.		Y TRUNNION
32	.0001	.0003	0000	J •	0.	0 •		Y TRUNNION
33	0000	.0007	.0000	0 •	0 •	0 •		CKAGE C.G.
7 L	.0001	.0750	.0001	G •	0.	0.	ATM PN	5,7 IF, OUTR
75 76	0000	.0030	0000	J.	0.	0.		4,5 IF, OUTR
₹5 ₹₹	0701 .0701	.0032	.0002	3.	0 •	3 •		8,1 IF,OUTR
38	•0000	.0050	• 00 00	0. 0.	0 • 0 •	0 • 3 •		2,3 IF, OUTR 5,7 IF, INNR
33	0000	0009	.0000	9.	0.	0.		4,5 IF, INNR
63	3731	.0015	.0001	3.	ů.	0.		8,1 IF, INNR
41	• 1030	0054	.0000	0•	0 •	0.		2,3 IF, INNR
42	• כור כ	.0013	•0000	.0000	.0000	0000	CMG, -	Y SIDE
43	.0000	.0013	.0001	0000	.0000	.0000	CMG, +	Y SIDE
44	• 2220	.0013	_	.0000	0000	.0000	CMG, +	X SIDE
45	.0001	.0001	0.	0.	0 •	0.	ATM SAS	•
46 47	.0001 .0001	.0001	0.	0.	0.	0 •	ATM SAS	
4.8	.0001	.0001	0. 0.	0. 9.	0. 0.	0 • 0 •	ATM SAS	
7.0	• 7 7 9 9	.0094	.0004					
c ŋ	.0000	0074	.0003			.0000	SPAR CE	CENTER
SUM	.2027	.2219	.3995	.0018				
			-		-			

TABLE A-5 ORBITAL CONFIGURATION MODAL SURVEY

TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 038 TEST FREQUENCY = 1.31 HZ. COMPONENT GMC GMC GMC GMC GM C GHC NAME (DX) (DY) (DZ) (TX) (TY) (TZ) BR/OWS SKIRT/IU/FAS .0186 .0001 .0152 .(102 .0003 .0180 .6239 .0900 . 60 25 v. 5-FAS 02 TANKS ₽. 0. MDA/STS/AM .0111 . 0000 . 01 30 .0007 .0306 .0000 .0034 .0007 5-AM N2 TANKS . 0000 0. 0. 0. COMMAND/SERVICE MOD. .0304 .078 .0135 .0001 • 41 32 .0313 DEPLOYMENT ASSEMBLY ε. Э. 0. •00.35 -.0002 . 20 99 .0000 ATH-RACK, CMGS, 4-SAS ·1823 -.0000 .0026 . 1187 .0001 ATM-SPAR CENTER · 85 3 6 . 3331 .0246 .0306 .0926 0. ATM-GRAZCAN CENTER .0506 . 30 99 .0163 .5300 .0033 .0390 ------------SUM .3567 . 2226 .6142 .0004 .0247 .0013

BR/OWS SKIRT/IU/FAS	.0435
6-FAS 02 TANKS	.0234
MDA/STS/AM	.C249
6-AM N2 TANKS	.0:42
COMMAND/SERVICE MOD.	. 4362
DEPLOYMENT ASSEMBLY	.0129
ATM-RACK, CMGS, 4-SAS	. 31 37
ATM-SPAR CENTER	.0810
ATM-GRA/CAN CENTER	20732

TABLE A-6 SENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

TEST MODE 03B RUN NO. 614 FREQUENCY = 1.31

MODE	SMC	G₩C	GMC	GMC	GMC	GMC	NODE
V7.	(ካላ)	(DY)	(DZ)	(TX)	(TY)	(TZ)	DESCRIPTION
1	.0072	.0000	.0134	.0000	•0058		BASE RNG/DWS SKIRT
7 7	.3019	.0000	.0002	.0000	.0013		OWS/IJ INTERFACE
	.0947	.0000	6000	.0000	•0032	•0000	
4 5	0.045	.0000	.0004	0.	0.	0 •	FAS 02 80TL1,+Y +Z FAS 02 80TL2,+Y +Z
7 6	.0062	.0000 .0000	•0004 •0003	3.	0.	0.	FAS 02 BOTL3,-Y +Z
7	.0053 .3037	.0000	.0005	9.	0.	3.	FAS 02 80167,-1 +Z
а	9919	•0000	.0005	0.	8.	0.	FAS 02 30TL5,-Y -Z
a	.0001	.0000	.0003	0.	0.	0.	FAS 02 30[L5,-Y -?
1.0	.0003	.0000	.0003	0.	0.	0.	FAS/AM/DA TF. +Y
11	.0133	.0000	.0004	0.	0.	0.	FAS/AM/DA IF, +Z
12	.0005	.0000	.0007	j.	0.	0.	FAS/AM/DA IFY
13	. 1000	0000	.0001	3.	ð.	0 •	FAS/34 IF, -Y -Z
14	.0000	0000	.0001	O •	0.	0.	FAS/AM IF, -Z
15	• ១១០១	.0000	.0001	3.	o.	0.	FAS/JA IF, +Y -Z
15	•0717	.0000	.0003	.0000	.0002	.0000	AM TUNNEL/SHEAR WB
17	. 1127	. 0000	.0020	.0600	•0000		AM TUNNEL/STS IF
įя	• 0 0 38	.0000	.0043	.0000	.3034		MDA/STS INTERFACE
19	.0770	.0000	.0058	•0000	.0001		MDA CONEZCYL ITREC
5.3	. 1035	.0000	.0000	0.	0.	0.	NZ TANK, +Y, LOWER
21	• 9 9 9 4	•0000	.0002	ŷ.	J•	0.	N2 TANK, +Y, UPPER
23 23	•0009	.0000	.0001	0.	0.	0 • 9 •	N2 TANK, +Z, LOMER N2 TANK, +Z, UPPER
24	. 0 0 0 1 1	• 0 0 0 0 • 0 0 0 0	.0002 .0003	0. 0.	0. J.	0.	NZ TANK -Z, LOWER
25	.3031	.0000	.0002	0.	0 •	0.	N2 TANK, -7, UPPER
26	.0029	.0000	.0001	0000	•0000		CM, FWD BULKHEAD
27	.0023	.0000	.0303	0000	.0005	.0001	•
23	.0031	. 3383	.0346	.0001	.0012	.0011	SM, FAD BULKHEAD
29	•0951	.0000	.3481	• 1003	•0059		SM, AFT BULKHEAD
טֿ צ	.0001	0000	0001	S •	3.	G •	LOWER D LATCH, DA
31	.0305	0001	.0045	J.	0.	0.	LOWER +Y TRUNNION
3?	•9904	0001	• 8647	0.	0 •	0 •	LOWER -Y TRUNNION
33	• 9 0 2 2	•0000	.0005	0 •	0 •	0 •	EREP PACKAGE C.G.
74	0225	0000	.0029	0.	0.	0.	ATM PN 6,7 IF, OUTR
35	.0393	0000	.0055	0.	0.	0.	ATM PN 4,5 TF, OUTR
र ५ इ७	.0407 .0347	nco1	.0153 .0378	0. 0.	0 • 0 •	J. D.	ATM PN 8,1 IF, OUTR
3′ 38	0742	• 0000	.0042	0.	0.	0.	ATM PN 2,3 IF, OUTR ATM PN 5,7 IF, INNR
3.0j	0112	0981	.0037	0.	0.	0.	ATM PV 4,5 IF, INNR
40	.0113	0002	0105	0.	0.	3.	ATM PN 8,1 IF, INNR
L 1	0 344	.0006	.0237	0.	0.	0.	ATM PN 2,3 IF, INNR
42	. 9036	0000	.0039	0000	.0001	0000	CMG, -Y SIDE
43	.0040	.0000	.0027	0000	0000	0000	CMG, +Y SIDE
44	.0145	0000	.0082	.0000	.3000	0000	CMG, +X SIDE
45	.0002	.0002	3.	0.	0.	0 •	ATM SAS, PN 1
4.5	.0002	.0002	0.	9 •	0.	0.	ATM SAS, PN 3
47	.0009	.0009	0.	0.	0.	0.	ATM SAS, PN 5
43	.0008	.0008	0.	0.	0.	0.	ATM SAS, PN 7
49 F0	•0536 •0505	.0031 .0000	.0245 .0163	0000	•0026		SPAR CENTER
: 0	• 00 00	• 0000	• 016)	.0000	.0033	• 0 0 0 0	GRAZCAN CENTER
SUM	. 3567	.0026	.6142	.0004	.0247	. 055	0

TABLE A-7 ORBITAL CONFIGURATION MODAL SURVEY

TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST HODE NO. 044	TEST FREQUENCY = 1.43 HZ.					
COMPONE NT	GM C	GMC	GMC	GMC	GM C	GMC
NAME	(XQ)	(DY)	(DZ)	(TX)	(TY)	(TZ)
BR/OWS SKIRT/IU/FAS	.0021	.0249	. 60 24	.6147	.0000	.096
5-FAS 02 TANKS	.0030	.0028	. 00 48	0.	0 •	0 •
MDA/STS/AM	.0901	.0096	. 22 20	•CJ29	0000	.0007
6-AM NO TANKS	.0093	.0008	.3092	C •	٤.	ð.
COMMAND/SERVICE MOD.	.0004	. 1988	.9091	.()27	.0001	.0063
DEPLOYMENT ASSEMBLY	.0835	.3097	. 99 15	£ •	G •	0.
ATM-RACK, CMGS, 4-SAS	. 20 94	. 3753	• 0552	.0305	.6301	.0011
ATM-SPAR CENTER	.0010	• J0 32	.0900	.0105	.0004	0 •
ATH-GRAZCAN CENTER	.0897	.0023	3900	.6211		.0257
SUM	. 2205	. 5185	.0541	.0524	.0010	.0434

BR/OWS SKIRT/IU/FAS	.0538
6-FAS 02 TANKS	.0107
MDA/STS/AM	.0133
6-AM N2 TANKS	.0014
COMMAND/SERVICE MOD.	.2085
DEPLOYMENT ASSEMBLY	.0(57
ATM-RACK, CMGS, 4-SAS	•6414
ATM-SPAR CENTER	.0151
ATM-GRA/CAN CENTER	.0512

TABLE A-8 GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

	1èè1	r 400E	94 A	RUN NO.	378	FREQUEN	CY = 1.43
NOTE 40.	540 (0X)	GMC (PQ)	GMC (DZ)		SMC (TY)	GMC (TZ)	
NO 123456789912345578991	(DX) .0000 .0100 .0112 .0011 .0000 .0000 .0010 .0000 .0000 .0000 .0000 .0000 .0000 .0000	(DY) .0214 .0712 .0005 .0703 .0506 .0011 .0005 .0701 .0007 .0700 -0000 .0001 -0000 .0001 .0029 .0000 .0000	007) 0000 0009 0004 0011 0002 0004 0013 00015 0009 0009 0009 00009 00009 00001 00001	(TX) .0077 .0027 .0043 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.	(TY) .0000 .0000 0. 0. 0. 0. 0. 0. 0. 0. 0.	0.0024 0.0024 0.0024 0.0024 0.0000 0.0002	DESCRIPTION BASE RNG/JWS SKIRT OWS/TJ INTERFACE IU/FAS INTERFACE FAS 02 BOTL1,+Y +Z FAS 02 BOTL2,+Y +Z FAS 02 BOTL4,-Y +Z FAS 02 BOTL5,-Y -Z FAS/AM/DA IF, +Y FAS/AM/DA IF, +Y FAS/AM/DA IF, -Y FAS/AM IF, -Z FAS/DA IF, -Y AM TUNNEL/SHEAR W9 AM TUNNEL/STS IF MDA/STS INTERFACE MDA CONE/CYL ITRFC N2 TANK, +Y, LOWER N2 TANK, +Y, UPPER
23 24 25 27 27 27 27 27 27 37 37 37 37 37 37 37 37 37 37 37 37 37	.0990 .0009 .0009 .0009 .0009 .0009 .0004 .0000 .0021 .0013 .0027 .0505 .0425	.0101 .0005 .0001 .0000 .0010 .0070 .0144 .1765 .0017 .0008 .0007 .0726 .0022 .0067 .0658	.0000 0001 .0001 .0000 .0007 .0007 .0000 .0041 .0069 .0172	.0005 .0007 .0012 0. 0. 0.	0. 0. 0. 0. 0.0000 0.0000 0.0001 0. 0. 0. 0.	0. 0. 0. 0.003 .0006 .0003 .0052 0. 0.	N2 TANK, +Z, LOWER N2 TANK, +Z, UPPER N2 TANK, -Z, LOWER N2 TANK, -Z, UPPER CM, FWO BJLKHEAD CM, AFT BJLKHEAD SM, FWO BJLKHEAD SM, AFT BJLKHEAD LOWER D LATCH, DA LOWER +Y TRUNNION LOWER +Y TRUNNION EREP PACKAGE C.G. ATM PN 5,7 IF, OUTR ATM PN 8,1 IF, OUTR ATM PN 8,1 IF, OUTR ATM PN 2,3 IF, OUTR
70 0 1 2 7 4 5 6 7 8 9 0 0 M	0010 .0139 .0711 .0125 .0195 .0117 .0000 .0004 .0004 .0001 .0001 .0001 .0007	0003 .0159 .0407 .1694 .0061 .0059 .0391 .0004 .0002 .0004 .00032 .0032	.0912 .0056 .0071 .0010 .0044 .0955 0000 0.	0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.	0. 0. 0. .3001 3000 3000 0. 0.	0. 0. 0. 0.0004 .0004 .0002	ATM PN 6,7 IF, INNR ATM PN 4,5 IF, INNR ATM PN 8,1 IF, INNR ATM PN 2,3 IF, INNR CMG, -Y SIDE CMG, +Y SIDE CMG, +X SIDE ATM SAS, PN 1 ATM SAS, PN 3 ATM SAS, PN 5 ATM SAS, PN 7 SPAR CENTER GRA/CAN CENTER

TABLE A-9 ORBITAL CONFIGURATION MODAL SURVEY

TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 054	TEST FREQUENCY = 1.66 HZ.					
C OMPONE NT	G₩C	GM C	GM C	GHC	GYC	GM C
NAME	(DX)	(YC)	(DZ)	(TX)	(TY)	(TZ)
BR/OWS SKIRT/IU/FAS	.0084	.0888	.0162	.(675		.£333
6-FAS 02 TANKS	.0141	.0174	.0149	0.	G .	0.
MDA/STS/AM	• G0 0 2	.0528	. 83 04	.[128	.0001	.0057
5-AM NO TANKS	.6007	.0036	.0016	G •	e •	0.
COMMAND/SERVICE MOD.	.0004	. 2882	.0921	.[187	0001	.[125
DEPLOYMENT ASSEMBLY	.0078	.0341	.0018	C •	J •	0.
ATM-RACK, CMGS, 4-SAS	•0773	.1172	.0560	.6303	.0000	.0884
ATM-SPAR CENTER	.0030	.5184	.0009	.9875	.(905	0.
ATM-GRAZCAN CENTER	.0018	.0168	.0009	·£159	.(305	.0087
SUM	.1138	• 60 74	.0946	.1222	.(315	.0505

BR/OWS SKIRT/IU/FAS	.2142
6-FAS 02 TANKS	.3465
MDA/STS/AM	.0718
6-AM N2 TANKS	.0059
COMMAND/SERVICE MOD.	•3219
DEPLOYMENT ASSEMBLY	,0137
ATM-RACK, CMGS, 4-SAS	.2513
ATM-SPAR CENTER	.0303
ATM-GRA/CAN CENTER	.0445

o'), as is the cut forning

TABLE A-10 GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

TEST MODE 05A RUN NO. 385 FREQUENCY = 1.65

	TEST	AJUE	05 A	RUN NO.	385	FREQUEN	UY = 1.55
がりひゃ	640	GMC	GMC	GMC	GMC	GMC	NODE
NO.	(אָר)	(DY)	(02)	(TX)	(TY)	(TZ)	DESCRIPTION
1	.0001	.0741	.0041	.0345	.0004		BASE RNG/JWS SKIRT
2	. 2231	.0046	.0003	.0121			OWS/IU INTERFACE IU/FAS INTERFACE
3	.0001	.0020	.0047				FAS 02 BOTL1,+Y +Z
4 5	.0043	.0017 .0045	.0052 .0021	0 •	g. 0.		FAS 02 BOTL2,+Y +Z
ب ج	.0003 .0002	.0051	.0005	0.	0.		FAS 02 30TL3,-Y +Z
7	• 0.043	.0014	.0024	0.	0.		FAS 02 BOTL4,-Y +Z
Ŗ	.0037	.0011	.0029	9.	0.		FAS 02 BOTLF, -Y -Z
à	.003	.0037	.0007	0.	0.		FAS 02 90TL6, -Y -Z
10	.3129	.0002	.0029	0.	0.	0.	FAS/AM/DA IF, +Y
11	0333	.0069	.0000	0.	0.		FAS/AM/DA IF, +Z
12	ព្រំក្	.0003	.0039	3.	0.		FAS/AM/DA IF, -Y
13	0002	0000	.0001	G •	0 •		FAS/DA IF, -Y -Z
14	.0000	.0008	.0000	0.	0.		FAS/AM IF, -Z
15	.0001	0001	.0001	0.	0.		FAS/JA TF, +Y -Z
15	. 2000	.0001	.0001	.0010	.0000		AM TUNNEL/SHEAR WB
17	. 0 0 0 0	.0038	.0000	.0030	.0000		AM TUNNEL/STS IF
18	.0901	• 9157	.0009	· UU45	• 0000		MDA/STS INTERFACE
19	.0701	.0332	.0002	.0039			MOA CONE/CYL ITREC
50	• 9934	• 0000	.0008	0•	J.	3.	N2 TANK, +Y, LOWER
21	•0003	.0002	0007	ŋ.	0 •	0.	N2 TANK, +Y, UPPER
22	•0~00	.0003	.0000	J•	0 •	J • ·	M2 TANK, +Z, LOWER
23	. 3300	. იი 24	.0000	0 •	9.	0.	N2 TANK, +Z, UPPER
24	.0000	.0007	.0000	0.	8.	0.	N2 TANK -Z, LOWER N2 TANK, -Z, UPPER
2=	. 1000	.0001	.0000	0. .0034	•0000	0.007	CM, FAD BULKHEAD
25	.0901	.0169	.0000 .0003	.0034	• 36 9 9	.0039	CM, AFT BULKHEAD
2 7	.0001	.0008 .0073	.0000	.0051	0000	.003	SM, FWD BULKHEAD
5a 58	.0004 0001	.2633	.0018	.0059	0002	.0096	SM, AFT BULKHEAD
3 G	.0000	.0017	.0004	0.	0.	0.	LOWER D LATCH, DA
74	. 9944	.0904	.0003	0.	0.	0.	LOWER +Y TRUNNION
72	9934	0010	.0011	0.	0.	0.	LOWER -Y TRUNNION
33	. 2000	.0030	.0000	0.	0.	0.	EREP PACKAGE C.G.
74	.0005	.0573	.0092	3.	0.	0.	ATM PN 6,7 IF, OUTR
25	.0294	.0178	· C054	3 •	0 •	0.	ATM PN 4,5 TF, OUTR
72		.0340	.0195	G •	0.	0.	ATM PN 8,1 IF, OUTR
マフ	• 0 7 3 7	.0001	.0013	0•	0.	0.	ATM PN 2,3 IF, OUTR
38	.0002	• 0083	.0029	J •	0.	0.	ATM PN 5,7 IF, INNR
3.0	.0130	.0000	.0014	0.	0 •	0.	ATM PV 4,5 IF, INNP
r G	.0123	.0029	.0083	0.	<u>0</u> •	0.	ATM PN 4,1 IF, INNR
41	• 0038	.0227	.0003	0.04	0.	9.	ATM PN 2,3 IF, INNR CMG, -Y SIDE
42	.0942	.0000	.0024	.0001	.0000	.0091 .0002	CMG, AY SIDE
43	.0931	.0000	. 88 è è	.0002 .0001	.0000 0000	.0001	
44	.0711	• 7748 - 0000	•0000	0.	0.	0.	ATM SAS, PN 1
45 46	0000	0900 .0002	0. 0.	0.	0.	0.	ATM SAS, 2N 3
47	.0002 .0030	.0002	8.	3.	0.	0.	ATM SAS, PN 5
48	.0001	.0001	0.	3.	0.	0.	ATM SAS, 2N 7
47	.0730	.0184	.0009	.0075	.0005		SPAR DENTER
= ()	.0318	.0168	.0009	.3159	.0005		GRAZCAN CENTER
-							•
SUM	.1138	.6074	.0946	•1222	.0015	• 063	5

TABLE A-11 ORBITAL CONFIGURATION MODAL SURVEY TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. COA	TEST FREQUENCY = 1.72 HZ.					
COMPONENT	GM C	GM C	GM C	GMC	GM C	GMC
NAME	(DX)	(DY)	(DZ)	(TX)	(TY)	(TZ)
BR/OWS SKIRT/IU/FAS	.0174	.0214	.0650	.0122	.(127	.0053
6-FAS 02 TANKS	.0091	.0026	·C129	€.	0 •	0.
MDA/STS/AM	.0062	•0187	.0059	•6332	• CD 24	.0763
5-AM N2 TANKS	.0340	• 0007	.00 27	€.	€.	0 .
COMMAND/SERVICE MOD.	.0562	· 6571	.0497	.9368	•L358	.0109
DEPLOYMENT ASSEMBLY	.0130	.0062	•0117	0•	0.	0 -
ATM-RACK, CMGS, 4-SAS	.1460	. 3415	•1375	.0301	.6001	.0002
ATM-SPAR CENTER	.0375	.j361	. 3166	•ė332	.0027	0.
ATM-GRAZCAN CENTER	.0331	• 0058	.0209	.0346	.0055	.0048
SUM	. 36 25	.163C	. 32 10	•[299	.0292	.0974

BR/OWS SKIRT/IU/FAS	•1339
6-FAS 02 TANKS	.0246
MDA/STS/AM	•1126
6-AM N2 TANKS	•0354
COMMAND/SERVICE MOD.	•1965
DEPLOYMENT ASSEMBLY	.0338
ATM-RACK, CMGS, 4-SAS	。3254
ATM-SPAR CENTER	.0661
ATM-GRA/CAM CENTER	.0746

TABLE A-12 GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

	TEST	HONE	06 A	รถท ทบ•	434	FREQUEN	CY = 1.72
ирпе •СМ	640 (nx)	GMC (DY)	GMC (DZ)	GMC (TX)	GMC (TY)	GMC (TZ)	
1 ?	.0978 .0125	.0183 .0009	.0515 .0052		•0028	0000	BASE RNG/OWS SKIRT OWS/IU INTERFACE
3 4 5	.7929 .7331 .0395	.0005 .0001 .0010	.0058 .0000 .0005	.0038 0.	.0026 0.	0.	TU/FAS INFERFACE FAS 02 BOTL1,+Y +Z FAS 02 BOTL2,+Y +Z
<u>ج</u> 7 ع	0000	.0008 .0005 .0001	.0031 .0045 .0030	0. 0. 0.	0 • 0 •	0.	FAS 02 90TL3,-Y +Z FAS 02 90TL4,-Y +Z FAS 02 90TLF,-Y -Z
10	.0308 .9746 .9024	.0001	.0017 .0002	0.	0 • 0 •	3. 0.	FAS 02 BOTL6,-Y -Z FAS/AM/DA IF, +Y
11 12 13	3003 .5091 .9001	.0013 .0001 000	.0003 .0020 .0003	9 • 8 • 3 •	0. 0.	0.	FAS/AM/DA IF, +Z FAS/AM/DA IF, -Y FAS/DA IF, -Y -Z
14 15	.0012 .0005	.0003	.0000	0.	0. 0. .0002	0.	FAS/AM IF, -Z FAS/DA IF, +Y -Z AM TUNNEL/SHEAR WB
15 17 18	.0014 .0019 .7010	.0002 .0108 .0167	.0012 .0001 .0007	.0096 .0013	.0093 .0018	.0464 .0291	AM TUNNEL/STS IF MDA/STS INTERFACE
19 20 21	.3919 .0148 .9964	.0110 0000 .0000	.0038 .0000 .0000	.0009 0. 0.	.0001 0. 9.	0035 0.	N2 TANK, +Y, LOWER N2 TANK, +Y, UPPER
2? 23 24	.1031 .0001 .0032	.0001 .0004 .0002	.0003 .0001 .0003	3. 3. 0.	G. G.	0. 0.	N2 TANK, +Z, LOWER N2 TANK, +Z, UPPER N2 TANK -Z, LOWER
25 25 27	.0144 .0271	.0000 .0030 .0003	.0000 .0325 .0001	0. .0016 .0008	0. 0004 .0038	.0003	N2 TANK, -Z, UPPER CM, FWD BULKHEAD CM, AFT BULKHEAD
29 28	.0195 .0051	%0010 %0528	.0011 .0460	.0021 .0023	•0003 •0003	.0014 .0036	SM, FWD BULKHEAD SM, AFT BULKHEAD
79 31 32	.0007 .0113 .0007	.0009 .0028 .0018	.0081 .0033 .0003	0 • 0 • 0 •	0 • 0 •	0.	LOWER D LATCH, DA LOWER +Y TRUNNION LOWEP -Y TRUNNION
33 74 35	-•9000 •9287 •9943	.906 .0237 .0956	.0000 .0498 .0294	0 • 0 • 0 •	0. 0. 0.	0. 0. 0.	EREP PACKAGE C.G. ATM PN 5,7 IF, OUTR ATM PN 4,5 IF, OUTR
? F. ኛን ኛጸ	.0513 .0151 .0065	0006 0004 .0015	.0001 .0013 .0282	3. 9. 3.	0 • 0 • C •	0. 9. 0.	ATM PN 8,1 IF,OUTR ATM PN 2,3 IF,OUTR ATM PN 5,7 IF,INNR
70 40	0 n10 .0246	.0001 .0037	.0122 .0019	0 • 6 •	0 • 0 •	0 • 0 •	ATM PN 4,5 IF, INNR ATM PN 8,1 IF, INNR ATM PN 2,3 IF, INNR
41 47 43	9804 .0002 .0032	.0057 0000	.0085 .0009	.0000	0030 .0001	.0000	CMG, -Y SIDE
44 15 46	.0021 .2008 .0004	.0010 .0008 .0004	.0006 0. 0.	.0000 3. 0.	.0000 0.	.0001 0.	CMG, +X SIDE ATM SAS, PN 1 ATM SAS, PN 3
47 48 40	.0000 .0000 .0375	.0000 .0000 .0061	0. 0. .0166	0. 0. .0032	0. 0. .0027	0. 0. .0375	ATM SAS, PN 5 ATM SAS, PN 7 SPAR CENTER
9114 P118	.9331	.0958 	.0209		.0055 		

TABLE A-13 ORBITAL CONFIGURATION MODAL SURVEY

TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 06	TEST FREQUENCY = 1.74 HZ.					
COMPONENT	GH C	GM C	GM C	GMC	GM C	GM C
NAME	(DX)	(DY)	(DZ)	(TX)	(T Y)	(TZ)
BR/OWS SKIRT/IU/FAS	. 0248	.0711	.1103	.0000	.0178	.6001
5-FAS 02 TANKS	.0157	. 30 84	.0127	C •	0.	0.
MDA/STS/AM	.0135	.0305	• 00 95	.0091	.0119	.0001
6-AM N2 TANKS	.6643	.0301	. 7911	3.	G •	0.
COMMAND/SERVICE MOD.	• 2283	.0006	.0760	•r904	.0329	.026
DEPLOYMENT ASSEMBLY	.0020	.0141	•0163	G.	0.	0.
ATM-RACK, CMGS, 4-SAS	. 21.92	.0064	.2156	6306	032	. 6000
ATM-SPAR CENTER	。G725	.0307	.0253	.0306	.059	0.
ATM-GRA/CAN CENTER	.0591	.3008	.0319	.0036	. 6097	.0010
SUM	، 4395	.0245	• 49 27	.0011	.0384	.0038

BR/OWS SKIRT/IU/FAS	.1540
6-FAS 02 TANKS	.0238
MDA/STS/AM	。9256
6-AM N2 TANKS	.0055
COMMAND/SERVICE MOD.	.1548
DEPLOYMENT ASSEMBLY	.0324
ATH-RACK, OHGS, 4-SAS	. 4413
ATM-SPAR CENTER	.1050
ATM-GRA/CAN CENTER	.1025

TABLE A-14 GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

	_						
	TEST	HOUE	8 30	30N NO.	610	FREQUEN	CY = 1.74
		6.110	614.0	640	5 H O	640	
NOUE	GMC	GMC	GMC (DZ)		SMC	GMC (TZ)	
иù•	(XU)	(PY)	(PZ)	(TX)	(TY)	(12)	DESCRIPTION
	6440	.0008	.0859	0000	.0134	nnar	BASE RNG/OWS SKIRT
1	.0118 .0040	.0001		.0030	.0043		OWS/IU INTERFACE
?	.0040	.0000		.0000	.0043		IU/FAS INTERFACE
4	.9015	.0001	.0027	3.	0.	0.	FAS 02 907L1,+Y +Z
5	.0019	.0000	.0027	g.	0.		FAS 02 BOTL2,+Y +Z
5	0000	0000	.0027	0.	0.		FAS 02 30TL3,-Y +Z
7	.9011	.0000	.0027	0.	0.		FAS 02 30TL4,-Y +Z
Ŗ	.0034	.0001	.0015	0.	0.		FAS 02 307L5,-Y -Z
0	.0396	.0001	.0005	0.	0.		FAS 02 30TLS,-Y -Z
10	.0010	.0002	• 00 03	3.	0.		FAS/A4/DA IF, +Y
11	3330	.0000	• 00 02	0.	0.		FAS/AM/04 IF, +7
12	.0004	.0000	.0003	0.	0.		FAS/AM/DA IF, -Y
13	.0003	.0000	.0003	0.	0.		FAS/DA IF, -Y -Z
14	•000,	.0000	.0001	3.	0.		FAS/AM IF, -7
1 7	.0003	.0000	.0000	3.	•	_	C 4 C 4 C 4 C 7
15	.0023	.0000		.0000	•0063	. 0 0 0 1	AM TUNNEL/SHEAR WB AM TUNNEL/STS IF
17	.0031	.0000	.0000	.0000	.0003	.0001	AM TUNNEL/STS IF
18	1944	.0000			.0012	.0000	MDA/STS INTERFACE
13	. 00 37	.0004	0052		.0001		
50	.0009	.0000	.0004	0.	0.		NZ TANK, +Y, LOWER
21	. 1005	.0000	.0002	j.	0.		NE TANK, +Y, UPPER
22	.0701	• 00000	• 00 02	0.	0.		N2 TANK, +7, LOWER
23	0202	.0000	.0000	0.	0.	0.	NZ TANK, +Z, UPPER
24	.0913	.0000	.0003	3.	0.	j.	NZ TANK -Z, LOWER
25	.0013	.0000	.0000	9.	0.	0 •	NZ TANK, -Z, UPPER
25	.0349	.0002		.0002	.0094		CM, FAD BULKHEAD
27	.0050	.0901	.0000	.0000	.0003	0000	
28	.0104	.0000	.0001	.0001	.0032	.0023	SM, FWD BULKHEAD
Ž٩	.0771	.0002	.0639	.0001	.0019	.0003	SM, AFT BULKHEAD
3.0	. 9015	.0000	.0121	o •	0.	3.	LOWER D LATCH, DA
31	.0932	.0057	.0012	G •	o.	0.	LOWER +Y TRUNNION
32	.0003	.0083	.0029	Û •	0 •	0.	LOWER -Y TRUNNION
33	0000	.0000	.0001	0 •	3.	0.	EREP PACKAGE C.G.
34	.0319	.0022	.0948	0.	0.	0.	ATM PN 6,7 IF, OUTR
₹ <i>1</i> 5	.0321	.0004	.0251	3 •	0.	0 •	ATM PN 4,5 TF, OUTR
35	.0592	.0391	0077	0 •	0 •	0 •	ATM PN 3,1 IF, OUTR
77	.0334	0006	0000	0.	0.	o •	ATM PN 2,3 IF, OUTR
38	• 0 0 8 0	0000	• 649 8	0.	0.	0.	ATM PN 5,7 IF, INNR
79	•0093	.0002	•0115	3.	0.	0 •	ATM PN 4,5 IF, INNR
4 Ü	.0189	• 0017	.0102	O •	0.	0, •	ATM PN 8,1 IF, INNR
41	.0013	0001	• 0849	0•	0.	. 0 •	ATM PN 2,3 IF, INNR
42	•0023	.0008	• 0064	0000	• 30 0 0	0000	CMG, -Y SIDE
43	.0763	.0000	.0052	0000	.3001	•0000	CMG, +Y SIDE
44	• 9936	.0002	• 0008	.0000	.0000	•0000	CMG, +X SIDE
45	.0911	.0011	0.	0 •	0 •	0 •	ATM SAS, PN 1
45	.0010	.0010	0-	0.	0.	0.	ATM SAS, PN 3
47	.0001	.0001	0.	0.	0.	0.	ATM SAS, PN 5
48	.0001	.0001	0.	0.	0.	0.	ATM SAS, PN 7
49	.0725	.0007	0253	.0006	.0059		SPAR CENTER
50	.9591	.0008	.0319	.0000	.0097		GRAZCAN CENTER
MLP	. 4395	.0245	.4927	.0011	.0384		

TABLE A-15 ORBITAL CONFIGURATION MODAL SURVEY TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 07/	TEST FREQUENCY = 2.51 HZ.					
COMPONENT	GMC	GM C	GM C	GMC	GM C	G M C
NA ME	(DX)	(DY)	(DZ)	(TX)	(YY)	(TZ)
BR/OWS SKIRT/IU/FAS	-0027	. 0339	.0183	.1284	. 5000	.0335
5-FAS 02 TANKS	.0062	.3270	.0391	C.	≎.	0.
MDA/STS/AM	.0001	• J867	.0005	.0237	.0301	.[039
5-AM N2 TANKS	.0811	. 28 90	.0932	ε.	0.	a .
COMMAND/SERVICE MOD.	• 60 3 3	- 1740	.0009	.[861	0 0 1	.6106
DEPLOYMENT ASSEMBLY	.0873	.0249	0002	C •	0.	0.
ATM-RACK, CMGS, 4-SAS	•6152	.1278	.0364	.0302	.(330	.0061
ATM-SPAR CENTER	.CC00	.0417	0000	.1379	.0000	0.
ATM-GRA/CAN CENTER	.0091	.9378	. 0000	• € 110	5006	.0012
SUM	.8331	•5621	.0983	. 2573	.0301	.0493

BR/OWS SKIRT/IU/FAS	•2169
6-FAS 02 TANKS	.0723
NDA/STS/AM	-1149
6-AM N2 TANKS	.0134
COMMAND/SERVICE MOD.	•2719
DEPLOYMENT ASSEMBLY	.0320
ATM-RACK, CMGS, 4-SAS	•1789
ATH-SPAR CENTER	.0496
ATM-GRA/CAN CENTER	.0501

TABLE A-16 GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

	- 1591	AUDE	07 A	RUN NO.	431	FREQUEN	CY = 2.51
₩ე∩= ₩ე.	ังหอ (xc)	GMC (DY)	GMC (D7)	GMC (TX)	54C (TY)	GMC (ST)	
1	.0000	.0200	.0001		.0000	.0129	BASE RNG/OWS SKIRT
?	.0000	9001	.0061	. 9223		.0923	OWS/IU INTERFACE
7	0000		.0057	.0380	.0000		TU/FAS INTERFACE
4 5	.3018 .0013	.0021	.0117 .0043	0.	0.		FAS 02 30TL1,+Y +Z FAS 02 30TL2,+Y +Z
3	• 0010	.0021	.0028	0 •	0.		FAS 02 BOTL3,-Y +Z
7	1003	0000	.0079	Ó.	0.		FAS 02 BOTL4,-Y +Z
Q	. 3720	.0283	.0105	1.	0.		FAS 02 90TLF,-Y -Z
3	0001	.0149	.0019	0.	0.		FAS 02 90TL6,-Y -Z
1.0	.0012	.0012	.0049	3 •	0 •	0.	FAS/AM/DA IF, +Y
11	. 2571	.0021	.0001	0 •	0 •	0.	FAS/AM/DA IF, +Z
12	.0912	.0024	.0076	0.	9.		FAS/AM/DA IF, -Y
1 7	.0701	.0015	0004	0.	0.		FAS/34 IF, -Y -Z
14 1 =	3000 -0001	.0059 .0005	.0003	9 •	0 •		FAS/AM IF, -Z FAS/DA IF, +Y -Z
15	•0303	•9005 •9115		0. • 0023	0. 1000	0.	AM TUNNEL/SHEAR WB
17	2000	.0136	0001	.3877	-0000	.0059	AM TUNNELISTS IF
18	. 3301	.0235	0001	. 10 90	.0001	0021	MDA/STS INTERFACE
43	.0000	· 9510	. 0003	.0047			MOA CONE/CYL ITREC
27	.0001	.0004	0015	J •	0 •		N2 TANK, +Y, LOWER
21	•0003	.0010	. 0017	o.	0.	-	NZ TANK, +Y, UPPER
22	.0000	.0002	.0003	0.	0.		N2 TANK, +Z, LOWER
23 24	.0003	.0000 .0027	,0000	9. 9.	0.		N2 TANK, +Z, UPPER
2 E	.0004 .0009	• 0027 • 0045	.0000	9.	0 • 0 •		N2 TANK -7, LOWER N2 TANK, -7, UPPER
26	3000	.0578					CM, FWD BULKHEAD
27	.0004	.0181		. 0144			CM, AFT BULKHEAD
28	0031	.0050	.0000	.0268	•0000	.0001	SM, FWD BULKHEAD
29	0001	.0931	.0000	.0365	0001	.0072	SM, AFT BULKHEAD
3.0	• 1 9 9 3	.0263	.0003	0•	J.		LOWER D LATCH, DA
71	• 0252	0008	0001	o.	0.		LOWER +Y TRUNNION
.77 .77	•0021 -•0000	0008	0002 .0000	g.	0.		LOWER -Y TRUNNION
34	0003	.0002 .0156	.0007	0. 0.	0 • 0 •	0.	EREP PACKAGE C.G. ATM PN 6,7 IF, OUTR
75	.0010	.0161	.0119	0.	0,		ATM PN 4,5 IF, OUTR
35	.0942	.9228	.0097	0.	0.	9.	ATM PN 3,1 IF, OUTR
2.7	.9312	.9551	.0003	3.	0.		ATM PN 2,3 IF, OUTR
ĄĘ	.0001	0001	.0002	0 •	3.	0 •	ATM PN 6,7 IF, INNR
3.0	• 0 ° 25	0001	.0019	0.	0.	0.	ATM PN 4,5 IF, INNR
4.9	.9134	.0024	.0050	0.	0.	0.	ATM PN 3,1 IF, INNR
41 47	.0005	.0081	.0003	3.	9.	0.	ATM PN 2,3 IF, INNR
43	•0307 •0307	.0012	.0930 .0027	•0000 •0001	0000		CMG, -Y SIDE
44	•0000	.0012 .0036	0000	.0001	•0000 •0000		CMG, +Y SIDE CMG, +X SIDE
45	.0003	.0003	0.	0.	0.	0.	ATM SAS, PN 1
46	• 0003	•0003	0.	0.	0.	0.	ATM SAS, PN 3
47	.0023	.0003	0.	J.	0.	0 •	ATM SAS, PN 5
4 R	.0003	.0003	0.	0.	0.	3.	ATM SAS, PN 7
49	.0000	.0417	0000	.0079			SPAR CENTER
5 J	.9001	•0778	.0000	.0110	0000		GRAZCAN CENTER
PL?	.0331	•5621	. 0 98 3		.0001		

TABLE A-17 ORBITAL CONFIGURATION MODAL SURVEY

TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 08/	TEST FREQUENCY = 3.06 HZ.					
C OM PONE NT	GMC	GN C	GM C	GMC	GM C	GMC
NAME	(BX)	(YG)	(D Z)	(TX)	(TY)	(TZ)
GR/OWS SKIRT/IU/FAS	.6972	.0000	. 31 77	0006	.0370	.0015
5-FAS 02 TANKS	.0344	.[]23	.0060	ŋ .	0.	9.
MA/STS/ACP	8000	.0301	.1888	001	.[324	.0002
5-AM N2 TANKS	.0005	-0000	• 9730	0.	0.	0.
COMMAND/SERVICE MOD.	.0064	.0982	• 36 11	.0062	.0158	.0008
DEPLOYMENT ASSEMBLY	.0006	· J135	.0077	6.	0.	0.
ATH-RACK, CMGS, 4-SAS	-0066	.3317	•1986	.0000	.000	0000
ATN-SPAR CENTER	.0015	.0391	.0441	.0002	.6004	0.
ATH-GRAZCAN CENTER	.0016	.0002	.0361	0000	• 0006	.0000
SUM	. 05 96	.:182	.8530	.0363	• (562	.0026

BR/OWS SKIRT/IU/FAS	.0334
6-FAS 02 TANKS	.0427
MDA/STS/AM	.2223
6-AM N2 TANKS	.0035
COMMAND/SERVICE MOD.	.3845
DEPLOYMENT ASSEMBLY	.0218
ATM-RACK, CMGS, 4-SAS	.2070
ATM-SPAR CENTER	.0454
ATM-GRA/CAN CENTER	.0385

TABLE A-18 GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

	TEST	MODE	08 A	PUN NO.	452	FREQUENCY = 3.05
челт мл.	640 (nx)	GMC (DY)	640 (DZ)	GMC (TX)	GMC (TY)	GMC NODE (TZ) DESCRIPTION
1	• 0005	.0901	.0149	.0000		.0000 BASE RNG/DWS SKIRT
2	.0013	.0000		.0300		
3	• 0 9 3 7	.0000	0000	0000		
4	•9901	.0003	.0005	9•	0.	0. FAS 02 30TL1,+Y +Z
, 5	.0007 .0012	.0005	.0015 .0015	0. 3.	0.	0. FAS 02 30TL2,+Y +Z 0. FAS 02 30TL3,-Y +Z
7	.0002	.0003	.0019	J.	0.	9. FAS 02 30TL4,-Y +Z
R	0015	.0004	.0009	0.	0.	0. FAS 02 30TL5,-Y -Z
a a	. 2 7 3 9	.0003	.0009	0.	0.	0. FAS 02 30TL5,-Y -Z
13	0001	.0000	.0001	0.	0.	0. FAS/AM/DA IF, +Y
11	.0011	.0000	.0319	0.	0.	0. FAS/AM/DA IF, +Z
12	.3901	0900	.0005	9.	0.	O. FAS/AM/DA IF, -Y
13	.0000	0002	0000	3 •	0 •	0. FAS/7A IF, -Y -Z
14	• 7 2 7 5	.0001	.0001	9.	3 •	0. FAS/AM TF, -Z
1=	.0000	0000	.0000	0•	0.	9. FAS/DA IF; +Y -Z
15	.3931	.0000	.0005		.3037	.0000 AM TUNNEL/SHEAR WB
17	.0002	.0000		.0000	.0615	.0000 AM TUNNEL/STS IF
18	.0004	0000	• 0535	0030 3001	.0291	.0003 MD4/STS INTERFACE
19 20	.0001 .0000	.0001 .0000	.1273 .0001	3.	.0021 0.	0000 MDA CONE/CYL ITREC 0. N2 TANK, +Y, LOWER
21	.0000	.0000	.0304	3.	0.	0. NO TANK, +Y, UPPER
22	.9301	.0000	.0004	0.	0.	0. NZ TANK, +Z, LOWER
23	. 6700	.0000	.0009	0.	0.	0. N2 TANK, +7, UPPER
24	• 0003	.0000	.0004	9.	0.	0. 12 TANK -Z, LOWER
25	• 3300	.0000	.0008	0.	0.	0. NO TANK, -Z, UPPER
25	.0116	.0000	•1309	.0094	.3641	.0003 CM, FWD BJEKHEAD
27	.0395	.0001	.0753	3001	0005	0000 CM, AFT BULKHEAD
28	• 0 0 35	0000	.0185		.0031	.0004 SM, FAD BULKHEAD
5.3	.3397	.0000	•1363	0001	•0071	.0002 SM, AFT BUCKHEAD
33	3 7 7 1	.0000	.0071	3.	0.	D. LOWER O LATCH, DA
31 マク	• n n n 4	.0066	0000 0000	ŋ.	0.	0. LOWER +Y TRUNNION
33 3	.0003 0000.	.0000	0000	ິ. ປ•	0. 9.	Under -y trunnionEREP PACKIGE C.G.
34	0001	•0000 •0007	.0481	3.	0.	0. ATM PN 5,7 IF, OUTR
35	.9914	.0004	.0183	0.	0.	0. ATM PN 4,5 IF, OUTR
35	.0007	.0002	.3177	0.	0.	0. ATM PN 8,1 IF,0UTR
77		0000	.0209	0.	J.	0. ATM PN 2,3 IF, OUTR
38	3901	.0001	• C308	0 •	O• .	0. ATM PN 5,7 IF, INNR
, र ()	. 3031	.0000	• 0 0 9 9	3 •	ð.	J. ATM PN 4,5 TF, INNP
۲ŋ	.0715	.0000	.0151	າ•	Ü •	0. ATM PN 3,1 IF, INNR
41	• 0 1 0 8	. 9000	• G182	5.	J.	0. ATM PN 2,3 IF, INNR
4.7	.0003	.0000	.0072	0000	0060	.0000 CMG, -Y 317E
67	• 0003	0000	.0061	0000	.0000	0000 CMG, +Y SIDE
44 45	.ეიეട ეიეე	0000	.0058	.3000	.0000	.0000 CMG, +K SIDE
45	9991	0000 0001	0• 0•	0. 0.	0. 0.	O. ATM SAS, PN 1 O. ATM SAS, PN 3
47	.0002	.0082	0.	3.	0.	O. ATM SAS, PN 3
4.8	.0001	.0002	0.	0.	0.	0. ATM SAS, PN 7
49	.0015	.0901		0002	.0004	.0015 SPAP DENTER
= ŋ	.3:15	.0102	.0361		.0006	
						** ** **
SUM	.0596	.0182	•8 630	.0003	• 3562	• 0041

A

TABLE A-19 ORBITAL CONFIGURATION MODAL SURVEY TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 09A	TEST FREQUENCY = 4.10 HZ.					
C OM PONE NT	GM C	GM C	GM C	GMC	GM C	GMC
NAME	(DX)	(DY)	(DZ)	(TX)	(TY)	(TZ)
9R/ONS SKIRT/IU/FAS	.0002	.0359	.0052	.0539	6000	.009
6-FAS 02 TANKS	.0094	.3299	• 02 37	0.	9.	0.
MDA/STS/AM	.0000	. 30 05	.0003	.0394	.0000	.0761
5-AM N2 TANKS	. 67 7 1	. 38 97	.0032	6.	9.	0.
COMMAND/SERVICE MOD.	.0032	.0019	.0008	•7972	. (001	.0015
DEPLOYMENT ASSEMBLY	.0008	.0019	. 33 26	0.	8.	8 •
ATM-RACK, CMGS, 4-SAS	.0169	.0114	.0373	·1001	.0000	.0000
ATH-SPAR CENTER	.0000	• 00 37	.0036	.0121	.0000	0 •
ATH-GRA/CAN CENTER	.0000	.0005	. 23 30	.0028	.6000	.0069
SUM	.0215	• 05 34	.9491	.8755	.0001	.0094

BR/OWS SKIRT/IU/FAS	-0761
6-FAS 02 TANKS	. 9540
MDA/STS/AM	.0163
6-AM N2 TANKS	.3010
COMMAND/SERVICE MOD.	.8047
DEPLOYMENT ASSEMBLY	.0053
ATM-RACK, CMGS, 4-SAS	•0 356
ATM-SPAR CENTER	.3028
ATM-GRA/CAN CENTER	.0943

TABLE A-20 GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

TEST MODE 09A RUN NO. 443 FREQUENCY = 4.13

	1,7,71	1 711112	цэн	KON NO.	443	FREGUE	4C7 = 4.13
פרסמ	GMO	GMC	GMC	GMC	GMC	GMO	
40.	(70)	(DY)	(D7)	(TX)	(TY)	(17)	DESCRIPTION
1 2	.0000	.0005	.0000	.0324	.0000	.0001 .0001	BASE RNG/JWS SKIRT OWS/TU INTERFACE
र 4	.9009 .0000	0000 .0035	.0012 .0054	.0202	0000	0.007	IU/FAS INTERFACE FAS 02 30TL1,+Y +Z
÷	.0000	.0182	.0027	0.	0.	0.	FAS 02 BOTL2,+Y +Z
5	.0000	.0061	.0021	0 •	0.	0.	FAS 02 30TL3,-Y +Z
7	• 0000	.0134	.0056	9.	ŋ.	3.	FAS 02 BOTL4,-Y +Z
я	.0002	.0024	.0052	3.	ð•	0.	FAS 02 BOTLE, -Y -Z
າ 1 ີ່ງ	.0000 .0000	.0163 .0000	.0019 .0016	J.	0 • 3 •	0 • 0 •	FAS 02 30TL6,-Y -Z FAS/AM/DA IF, +Y
11	0030	.0030	.0000	0.	3.	9.	FAS/AM/DA IF, +Z
12	.0001	.0000	.0023	3.	0.	3.	FAS/A4/DA IF, -Y
17	• 9000	.0004	0001	0 •	0.	0 •	F49/04 IF, -Y -Z
14	0000	.0010	0000	J.	ე.	0.	FAS/AM IF, -Z
1 ⁵	•0000 •0000	.0001 .0000	.0001 .0000	.0002	0. .0000	0.	FAS/DA IF, +Y -Z AM TUNNEL/SHEAR WB
17	.0000	.0001	.0001	.3020	.0000		AM TUNNELISTS IF
19	• 0000	9900	.0000	.0037	0030	.0017	
17	.0003	.0005	.0002	.0035	0000	.0001	MDA CONEZCYL ITREC
20	0000	.0000	.0002	j.	0.	J.	N2 TANK, +Y, LOWER
21 22	.0000 .0000	.000 .0003	.0000 .0000	0. 0.	0.	0. 0.	NO TANK, +Y, UPPER
<u> </u>	• 9999	•9003 •9081	• 00 00	0.	0.	0.	N2 TANK, +Z, LOWER N2 TANK, +7, UPPER
24	• 3000	.0102	.0000	3.	G.	3.	NZ TANK -Z, LOWER
22	.0000	•0000	. 9999	0.	0.	0.	N2 TANK, -7, UPPER
25	• 0 0 0 2	• 90 0 9	0001	.0829	.0039	•0000	CM, FWD BULKHEAD
27 28	.0904 .0226	0901 .0030	.0028	•1376 •2353	.0001 0000	.0000	
20 20	•0:25 •0:30:3	.0030	0009* 0012	• 7373 • 3415	•0003	.0014	SM, FWD BULKHEAD SM, AFT BULKHEAD
7)	.0000	.0002	.0000	0.	9.	0.	LOWER D LATCH, DA
31	.0008	.0001	.9013	0.	0.	0.	LOWER +Y TRUNNION
30	.0000	-•0000	.0012	0.	3 •	J •	LOWER -Y TRUNNION
33	.0000	• 3r 17	.8363	3.	0.	J•	EREP PACKAGE D.G.
74	.0011 .0170	0000 0000.	.0001 .0019	0. 9.	0. 0.	3. 3.	ATM PN 5,7 IF, OUTR ATM PN 4,5 IF, OUTR
36	.0022	.9811	.0314	j.	0.	9.	ATM PN 8,1 IF, OUTR
77	.0003	.0937	0000	9.	0.	9.	ATM PN 2,3 TF, OUTR
₹ ₽	• 1115	.0352	.0000	C •	០.	9.	ATM PN 5,7 IF, INNR
79	.0004	.0009	.0009	3 •	0 •	0.	ATM PN 4,5 IF, INNR
ևე 41	.0016 0000	0003 .0001	.0013 .0004	0.	0 • 0 •	0 • 0 •	ATM PN 8,1 IF, INNR ATM PN 2,3 IF, INNR
42	0003	.0561	.0007	•0690	•0000	.0000	CMG, -Y SIDE
43	0004	.0001	.0005	.0000	0000		CMG, +Y SIDE
44	• 0000	•0000	0000	. 0000	.0000	.0000	CMG, +X SIDE
45	0000	0000	0.	9.	0.	0.	ATM SAS, PN 1
した	.0300 0330	.0000 0000	G• O•	9. 9.	9. 0.	0. 0.	ATM SAS, PN 3 ATM SAS, PN 5
4.9	0000	0000	0.).	0.	3.	ATM SAS, PN 7
4 3	. 0000	.0007	.0000	. 3321	.3300		SPAR CENTER
≂ C	.0000	.0005	.0000	.0028	.3000	.0009	GRA/CAN CENTER
SUH	.0215	.0534	.0401	.9755	.0001	.0094	

TABLE A-21 ORBITAL CONFIGURATION MODAL SURVEY

TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 16	TEST FREQUENCY = 4.50 HZ.					
C OMPONE NT	G# C	GMC	GMC	GMC	GM C	GM C
NAME	(ÐX)	(DY)	(DZ)	(TX)	(TY)	(TZ)
9R/OWS SKIRT/IU/FAS	.0004	.0115	.0133	.0209	.0001	.0044
6-FAS 02 TANKS	.0018	. 53 15	.02 11	0.	9.	0.
MDA/STS/AM	.0000	.0352	.0001	0006	6000	.0360
5-AM N2 TANKS	.0000	. 3883	.0008	0 •	3 •	0 •
COMMAND/SERVICE MOD.	.0000	• 1116	.0010	•[29[.0000	.0042
JEPLOYMENT ASSEMBLY	.0022	• J054	• 33 2F	ម •	9.	0.
ATM-RACK, CMGS, 4-SAS	.1477	. 33 92	•1462	.0389	0000	.0006
ATM-SPAR CENTER	. 8034	0000	0300	. 6455	-0006	0 •
ATM-GRAZCAN CENTER	.0003	.0005	.0000	·£485	.0003	.0269
SUM	. 15 28	.4752	. 18 4 C	.1449	.0010	.9420

BR/OWS SKIRT/IU/FAS	.0506
6-FAS 02 TANKS	• 0235
MDA/STS/AM	.0412
6-AM N2 TANKS	.9011
COMMAND/SERVICE MOD.	• 1459
DEPLOYMENT ASSEMBLY	.0101
ATM-RACK, CMGS, 4-SAS	.6[46
ATM-SPAR CENTER	• 3465
ATM-GRAZCAN CENTER	.0765

TABLE A-22 GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

TEST MODE 10A RUN NO. 482 FREQUENCY = 4.53

พวกร	GMO	GMC	GHC	GMC	GMC	GMC	. NODE
N).	(04)	(PY)	(DŽ)				
							•
1	.0901	•0099	.0010		.0001	.0025	
2	0000	.0003	.0008		.0000		OWSVIU INTERFACE
3	.0000	.0000	.0056	• 0039	0000		IU/FAS INTERFACE
4 =	.0009	.0000	.0043	3.	0.	0.	FAS 02 30TL1,+Y +Z
Б	.0001 0000	.0009 .0006	.0017 .0003	0.	0.	0.	FAS 02 BOTL2,+Y +Z FAS 02 BOTL3,+Y +Z
7	•0006	0000	.0031	0.	0.	0.	FAS 02 BOTL4,-Y +Z
ع	.0003	.0000	.0073	ĵ.	0.	0.	FAS 02 90715,-Y -Z
વ	0000	9530	.0023	3.	0.	0.	FAS 02 30TL6,-Y -Z
10	.3002	.0000	.0019	0.	0.	0.	FAS/AM/DA IF, +Y
11	9930	.0010	.0000	0•	0 •	0 •	FAS/AM/94 IF, +7
12	.0901	• 0000	.0029	O •	0.	J •	FAS/AM/DA IF, -Y
1.3	0000	.0002	• 00 C7) •	0.	ŷ •	FAS/3A IF, -Y -Z
14	. 3000	0000	0000	3.	0.	0 •	FAS/A4 IF, -7
1=		.3000	.0003	0. .0001	0.000		FAS/DA IF, +Y -Z
15 17	.0000	.0001 .0001	.0000 .0000	.0001	0000		AM TUNNEL/SHEAR WE AM TUNNEL/STS IF
18	• 1 1 1 0 0	.0756	.0003		.6000		MOAZSTS INTERFACE
19	0000	.0294	.0001	3691			MDA CONEZCYL ITREC
20	.0000	• 0000	.0005	0.	0.	J •	NE TANK, +Y, LOWER
21	.0000	.0000	.0003	J •	0.	0 •	ME TANK, FY, UPPER
22	• 0000	.0001	.0000	0.	C • .	J •	N2 TANK, +Z, LOWER
? ₹	• 3033	.0001	.0000	9 •	<u> </u>	J •	NZ TANK, +Z, UPPER
24	.0000	.0000	.0000	3.	0.	g •	NZ TANK -7, LOWER
25 25	.0000 0000	.0100 .0461	•0009 ••0000	0. .0034	0. 0000	0.002	N2 TANK, +Z, UPPER CM, FWD BULKHEAD
27	•3333	.0207	•0011		•0000		CM, AFT BULKHEAD
ŽΑ	.0001	.0097	0000	• 0 0 5 9	.0000		SM, FWD BULKHEAD
20	1300	.0351	0000	.3127	.2000	.0039	
30	.0000	• C 0 4 1	.0002	3.	3.	0 •	LOWER O LATCH, DA
4.	.0013	.0006	.0015	0 •	0 •	0 •	LOWER +Y TRUNNION
3.2	• 0008	.0001	.0007	0 •	0 •	0•	LOWER -Y TRUNNION
33	.0303	.0005	.0000	0.	0.	0.	EREP PACKAGE C.G.
34 26	.0005	.0191 .0002	.0017 .0372	ິງ •	0.	0. 0.	ATM PN 5,7 IF, OUTR
36	.0314 .0316	.0002	• 0318	0. 0.	0 •	0.	ATM PN 4,5 IF, OUTR
3 7	.0073	0422	.0017	0.	0.	0.	ATM PN 2,3 IF, OUTR
78	. [111	.1861	.0039	3.	9.	0.	ATM PV 5,7 IF, INNR
<u> 3</u> 3	.0292				0 •		ATM PV 4,5 IF, INNR
40	.0198	.0013	0295	3.	0.	0 •	ATM PN 8,1 IF, INNR
41	0012	•0178	.0019	J•	G •	0•	ATM PN 2,3 IF, INNR
P.3	.0071	.0073	.0107	.0002	.0000	.0001	CMG, -Y SINE
43	.0195	.0978		.0005	0000	• 0 0 0 3	CMG, +Y SIDE
44 45	•0030 •0003	•0003	.0301 0.	•0002 0•	•0000 0•	• u u u z	CMG, +X SIDE ATM SAS, PN 1
45	.3003	.0003	0.	3.	ິງ •	3.	ATM SAS, 2N 3
47	.3003	.0003	0.	0.	0.	0.	ATM SAS, PN 5
4.8	.0003	.0003	0.	0.	0.	0.	ATM SAS, PN 7
FJ	.0004	0000	0000	.0455	•0005	.0004	SPAR CENTER
F 9	.0003	.0005					GRAZCAN CENTER
SUM	.1528	.4752	.1840	.1449	.0010	. 0424	

TABLE A-23 ORBITAL CONFIGURATION MODAL SURVEY

TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 10	TEST FREQUENCY = 4.55 HZ.					
C OM PONE NT	GM C	GM C	GNC	GMC	GM C	GHC
NAME	(DX)	(PY)	(DZ)	(TX)	(TY)	(TZ)
BR/OWS SKIRT/IU/FAS	. 6894	.0192	.0130	.0218	. 33 3 8	.045
5-FAS 02 TANKS	.0023	.0013	.0207	0.	0.	9.
MDA/STS/AM	.0000	.0367	. 1002	6000	0000	.068
6-AH N2 TANKS	.0000	.0002	.0008	٥.	0.	0.
COMMAND/SERVICE MOD.	0000	.1127	.0011	.0265	.0000	.1937
DEPLOYMENT ASSEMBLY	.0025	• 9055	.0033	0.	8 •	0.
ATH-RACK, CMGS, 4-SAS	. 1468	.3103	.1478	.0018	0030	.0007
ATM-SPAR CENTER	.0006	0000	.0000	.0478	.0005	0.
ATM-GRAZCAN CENTER	.0091	.0003	.0000	.0423	.0001	.0273
SIIM	. 1528	. 4772	.187f	-1394	- 00 0 6	_0430

BR/OWS SKIRT/IU/FAS	.0500
6-FAS 02 TANKS	.0243
MDA/STS/AM	.0436
6-AM N2 TANKS	.0011
COMMAND/SERVICE MOD.	.1441
DEPLOYMENT ASSEMBLY	.0113
ATM-RACK, CMGS, 4-SAS	.6066
ATM-SPAR CENTER	.8490
ATM-GRA/CAN CENTER	.0701

TABLE A-24 SENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

	TĘSI	HUUE	108	RUN NO.	619	FREQUENC	Y = 4.55
400E 40.	640 (nx)	GMC (TY)	640 (92)	GMC (TX)	GMC (TY)	GMC (TZ)	NODE Description
			(97) .0001 .0009 .0063 .0045 .0025 .0017 .0007 .0007 .0009 .0009 .0009 .0009 .0009 .0009 .0009 .0009	(TX) .0149 .0029 .0039 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.	(TY) .0000 -0000 -0000 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.	0.028 9 0.028 9 0.009 1 0.009	
र १ १६ १६ १६	.0710 .0900 .0005 .0318 .0330	0001 .0006 .0194 .0002	.0008 .0000 .0020 .0365 .0326	0. 0. 0.	0.0.0.0	0 • 6 0 • 4 0 • 6	OWER -Y TRUNNION EREP PACKAGE C.G. ATM PN 6,7 IF,OUTR ATM PN 4,5 IF,OUTR ATM PN 3,1 IF,OUTR
37 38 30 40 41	.0103 .0295 .0179	.0414 .1862 .0310 .0021 .0074	.0043 .0146 .0302 .0020	0. 0. 0.	0.		ATM PN 2,3 IF,OUTR ATM PN 6,7 IF,INNR ATM PN 4,5 IF,INNR ATM PN 8,1 IF,INNR ATM PN 2,3 IF,INNR
42 44 45 47	.0975 .0093 .0000 .0004 .0003	.0074 .0080 .0001 .0004 .0003	.0107 .0127 .0901 0.	.0002 .0005 .0002 0.	.0000 0000 .0000	.0003 .0002	CMG, -Y SIDE CMG, +Y SIDE CMG, +X SIDE ATM SAS, PN 1 ATM SAS, PN 3 ATM SAS, PN 5
49 49 59	.0003 .0005 .0001	.0003 0000 .0003	0. .0000 .0000	0. .0478 .0423	.3001	.0006 S	ATM SAS, PN 7 Spar center Grazcan center
SUM	.1528	.4772	.1870	.1394	.0306	.0436	

TABLE A-25 ORBITAL CONFIGURATION MODAL SURVEY TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 11A TEST FREQUENCY = 5.03 HZ.

COMPONENT	GMC	GM C	GM C	GMC	GM C	GMC
NA ME	(EX)	(DY)	(7Z)	(TX)	(TY)	(TZ)
BR/OWS SKIRT/IU/FAS	.0026	.0002	.00 26	.0301	.010	.0000
6-FAS 02 TANKS	.0029	. 00 05	. 20 33	£.	0.	0.
MDA/STS/AM	.0057	- 20 05	.0128	.000	.0010	.0001
6-AM N2 TANKS	.0010	. 08 8 1	.0000	0.	e •	3.
COMMAND/SERVICE MOD.	.0173	.0023	.0133	•ប3ប្រ	.5002	.C016
DEPLOYMENT ASSEMBLY	.0006	.0093	. 00 99	0.	G.	C -
ATM-RACK, CMGS, 4-SAS	. 3288	.0046	. 3862	.0000	.3318	.6000
ATM-SPAR CENTER	.0005	.0000	.0048	.0001	.6869	θ.
ATM-GRAZCAN CENTER	.0002	0000	.0301	0901	•1997	.0003
SUM	• 3F 96	• 3176	• 41 99	.(302	.2007	.0021

BR/OWS SKIRT/IU/FAS	.0066
6-FAS 02 TANKS	.0037
MDA/STS/AM	.0132
6-AM N2 TARKS	.0011
COMMAND/SERVICE MOD.	.0346
DEPLOYMENT ASSEMBLY	•0197
ATM-RACK, CMGS, 4-SAS	.7215
ATM-SPAR CENTER	.0923
ATM-GRA/CAN CENTER	•1102

TABLE A-26 GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

TEST MODE 11A RUN NO. 536 FREQUENCY = 5.03

	1 5.3 1	1:7:12	11 ~	₹014 NO.	230	L WE BOEN	9.03
NOUL	GMC	GMC	GMC	GMC	GMC	GMO	
۷n.	(DX)	(DY)	(DZ)	(TX)	(TY)	(TZ)	DESCRIPTION
1	.0012	.0001	.0024	.0031	.0096	0000	BASE RNG/OWS SKIRT
ś	. 1004	0000	.0001	.0000	.0002		OWS/TU'INTERFACE
3	.0004	.0000	.0001	.0000	.0003	.0000	IU/FAS INTERFACE
4	.0001	.0000	.0000	3 •	0.	0 •	FAS 02 30TL1,+Y +Z
5	.0001	.0000	.0001	0.	0.	3.	FAS 02 BOTL 2,+Y +Z
5	.0003	.0002	.0001	0.	0.	0 •	FAS 02 BOTL 3,-Y +Z
•	.0004	.0001	.0000	0 •	0.	J •	FAS 02 BOTL4,-Y +Z
8	.0013	.0002	.0000	0.	0.	0.	FAS 02 BOTL5,-Y -Z
à	.0010	.0001	0000	0.	0.	o •	FAS 02 BOTL6,-Y -Z
13	.0001	0000	• 0000	0.	0 •	0.	FAS/AM/DA IF, +Y
11	0000	.0001	.0000	9 •	0 •	0 •	FAS/AY/DA IF, +Z
12	.0004	.0000	.0000	0.	0 •	0 •	FAS/AY/NA IF, -Y
13	.0000	.0000	0000	0 •	0.		FAS/DA IF, -Y -Z
14	.0002	.0000	.0000	g •	0.	0 •	FAS/AM IF, -Z
15	.0000	0000	.0000	0.	0.	0.	FAS/DA IF, +Y -Z
15	.0006	.0001	.0000	.0000	• 99 30	.0000	
17	.0012	.0001	.0001	.3000	.0091	.0000	AM TUNNEL/STS IF
18	.0021	0000	.0001	.0000	.0005	.0001	MDA/STS INTERFACE
19	.0018 .0002	.0003 .0000	.0025 .0000		•0003 0•	•0000	MOA CONE/CYL ITREC
29 21	.0002	.0000	.0000	0. 9.	0.	0 • 0 •	N2 TANK, +Y, LOWER N2 TANK, +Y, UPPER
22	.0001	.0000	.0000	0.	0.	0.	N2 TANK, +7, LOWER
23	.0002	.0000	.0000	0.	0.	0.	N2 TANK, +Z, UPPER
24	.0002	.0000	.0000	0.	0.	0.	N2 TANK -Z, LOWER
25	.0001	.0000	.0000	0.	0.	0.	N2 TANK, -Z, UPPER
25	.0027	.0008	.0049	.0000	0000	0000	CM, FWD BULKHEAD
27	.0033	.0008	.0037	0000	0001	0000	CM, AFT BULKHEAD
28	.0354	.0003	.0009	. 30 30	.0002	.0013	SM, FAD BULKHEAD
29	• 0 ጣምዓ	.0004	.0037	.0000	.0001	.0003	SM, AFT BULKHEAD
33	0001	.0003	.0073	0.	0.	g •	LOWER O LATCH, DA
31	0000	.0137	.0007	J •	0.	0.	LOWER +Y TRUNNION
32	• 9902	.0053	.0010	0•	0.	0.	LOWER -Y TRUNNION
33	• 0004	\bullet 0000	.0009	0.	0 •	Û •	EREP PACKAGE C.G.
74	.0921	.0014	.1128	0.	0.	0.	ATM PN 6,7 IF, OUTR
7 F	0003	.0001	.0013	0.	0.	0.	ATM PN 4,5 IF, OUTR
35	.0750	.0006	.0062	0.	0.	0.	ATM PN 9,1 IF, OUTR
37 38	.0050 .0365	0302	.0917 .0659	0•	0.	0.	ATM PN 2,3 IF, OUTR
	•	0043		0.	9.	0.	ATM PV 6,7 IF, INNR
7 U	.0896 .0860	.0618 .0039	0001 .0069	0. 0.	0. 0.). 0.	ATM PN 4,5 IF, INNR ATM PN 8,1 IF, INNR
41	.0512	0012	0756	0.	0.	8•	ATM PN 2,3 IF, INNR
42	0158	.0001	0007	.0000	•0006	.3000	CMG, -Y SIDE
43	.0125	.0001	.0001	.0000	.3097	0000	CMG, +Y SIDE
44	.0120	0000	.0240	.0000	.0005	.0000	CMG, +X STOE
45	.0005	.0006	0.	0.	0.	0.	ATM SAS, PN 1
45	.0008	.0008	0.	3.	0.	0.	ATM SAS, PN 3
47	.0006	.0006	0.	0.	0.	0.	ATM SAS, PN 5
4 8	.9804	.0004	0.	3.	0.	0.	ATM SAS, PN 7
40	.0005	.0000	.0048	.0001	• 1859	.0005	SPAR CENTER
50	.0002	0000	.0001	0001	1097		GRAZCAN CENTER
	~						
SUM	. 3596	.0176	.4199	.0002	.2007	.0025	>

TABLE A-27 ORBITAL CONFIGURATION MODAL SURVEY

TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 12	TEST FREQUENCY = 5.86 HZ.					
C OMPONENT	GMC	GM C	GMC	GMC	GH C	GM C
NAME	(XQ)	(PY)	(DZ)	(TX)	(TY)	(TZ)
BR/OMS SKIRT/IU/FAS	.0198	.1058	.0706	.0078	. 6001	.0718
6-FAS 02 TANKS	• 0 2 22	1398	• 11 8F	0.	0 •	0 •
MDA/STS/AM	.0003	• 2503	.0001	.017	.6001	.0159
6-AM N2 TANKS	.0005	. 0296	.0129	0.	0.	0.
COMMAND/ SERVICE MOD.	.0006	. 2275	.0319	•[11€	.0301	.0078
DEPLOYMENT ASSEMBLY	.0102	. 5444	.0003	C •	0.	0 •
ATM-RACK, CMGS, 4-SAS	.0062	.0163	.0973	0000	.0000	.0000
ATM-SPAR CENTER	.0000	.6334	.0000	.021	.0091	0.
ATH-GRAZCAN CENTER	.0000	.0006	.00 70	.[32[.:002	.0013
SUM	.0509	• 62 46	. 23 16	. (254	.1336	.0969

BRIONS SKIRT/IU/FAS	. 266 9
6-FAS 02 TANKS	.2804
MDA/STS/AM	• 7786
6-AM N2 TANKS	.0330
COMMAND/SERVICE MOD.	.2495
DEPLOYMENT ASSEMBLY	.0549
ATM-RACK, CMGS, 4-SAS	• 1299
ATM-SPAR CENTER	.31.27
ATM-GRA/CAN CENTER	.0641

TABLE A-28 GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

	1591	MODE	12 A	RUN NO.	574	FREQUEN	CY = `5.85
がいひこ	GMO	GMC	GMC	GMC	GMC	GMC	
40.	(XC)	(DY)	(DZ)	(TX)	(TY)	(TZ)	DESCRIPTION
		4707	0000	0065	0000	01.01	DACE THE COLOR OFFER
1 ?	.0003	.0727 .0000	.0003 .0120	.0055 .0001	.0000 .0002		PASE RNG/OWS SKIRT OWS/IU INTERFACE
	.0001 0000	.0047	.0440	.0012	0031		IU/FAS INTERFACE
4	.0054	.0207	.0364	0.	3.		FAS 02 907L1,+Y +Z
5	.0011	.0435	.0179	j.	0.		FAS 02 BOTL2,+Y +Z
5	.0005	.0445	0104	0.	0.		FAS 02 BOTL3,-Y +Z
7	. 2342	.0300	.0282	0.	0.		FAS 02 BOTL4,-Y +Z
3	. 9 9 9 0	.0007	.0209	0.	0.		FAS 02 BOTL5,-Y -Z
a	.0011	.0003	.0056	0.	0.		FAS 02 BOTL6,-Y -Z
1 3	• 0 147	.0023	.0041	0.	0.	0.	FAS/AY/DA IF, +Y
11	• 9 5 9 9	.0208	.0000	0 •	0 •		FAS/A4/DA IF, +7
12	.0053	.0046	.0097	0.	0.		FAS/AY/DA IF, -Y
17	.0002	.0001	0005	· .	0.		FAS/DA IF, -Y -Z
14	6001	.0205	.0003	g •	0.		FAS/AM IF, -7
1= 15	.0003 .3991	0000 .0092	.0005 .0001	₀. •9000	0. •0880	0.000	FAS/JA IF, +Y -Z AM TUNNEL/SHEAR WB
17	• 2227	0224	.0000	.0004	.0000	• 0 0 0 0 • 0 0 4 3	AM TUNNEL/STS IF
† a	.0001	0008	.0000	.0005	.0000		MDA/STS INTERFACE
19	.0001	0296	0000	.0007	0000		MOA CONE/CYL ITREC
21	. 000+	.0027	.0016	0.	0.		N2 TANK, +Y, LOWER
21	•0000	.0038	.0013	0.	J •		N2 TANK, +Y, UPPER
2?	.0000	.0067	.0000	0.	0.	0.	NZ TANK, +Z, LOWER
27	.0000	.0112	.0000	3.	0.	0.	N2 TANK, +Z, UPPER
24	• 9 9 9 9	.0719	.0000	0.	0.	0.	N2 TANK -Z, LOWER
? F 2 S	.0000 .0001	.0033 .0097	•0000 •0000). .0007	0. 0000		N2 TANK, -7, UPPER CM, FHD BULKHEAD
27	.0301	.0589	.0017	.0007	•0000		CM, AFT BULKHEAD
- 29	. 0001	1267	.0001	.0040	0000		
29	0000	0-21	.0001		.0031		SM, AFT BULKHEAD
3 3	.0001	.0142	•0000	0.	0.	0.	LOWER D LATCH, DA
31	. 11055	0002	.0000	0.	0.		LOWER +Y TRUNNION
3.5	• 0 0 35	• 0000	• 00 03	ŋ •	C •		LOWER -Y TRUNNION
,र र	•0001	.0304	• 00 00	3.	0 •	0 •	EREP PACKAGE C.G.
74	.0001	.0019	.0008	0.	0.	0.	ATM PN 6,7 IF, OUTR
715 716	.3812	.0002	.0012	0.	0 •	0.	ATM PN 4,5 IF, OUTR
75 37	.0013 .0001	.0000 .0006	.0009 .0005	0. J.	0. 0.	0 • 0 •	ATM PN 8,1 IF, OUTR ATM PN 2,3 IF, OUTR
27 Ag	0001	•0005 •0088	• 00 00	0.	0.	0.	ATM PN 6,7 IF, INNR
70	- 9 9 9 1 - 9 9 2 5	.0018	.0005	3.	0.	0.	ATM PN 4,5 IF, INNR
40	.0000	.0196	.0010	0.	0.	0.	ATM PN 8,1 IF, INNR
41	3 000	.0009	.0005	0.	0.	0.	ATM PN 2,3 IF, INNR
42	• 9 9 0 5	.0005	.0004	.0000	.0030		CMG, -Y SIDE
43	.0931	.0006	.0005	.0000	.0000		CMG, +Y SIDE
44	• 0 0 0 0	.0901	• 0000	. 3000	.0000		CMG, +X SIDE
45	.0100	.8500	0.	0.	0.	0.	ATM SAS, PN 1
47	.9031	.0301	0.	0.	0.	0 •	ATM SAS, PN 3
48	.0000 .0001	.0000 .0001	0. 0.	0 • 0 •	0 • 0 •	0.	ATM SAS, PN 5 ATM SAS, PN 7
49	•0000	.0004	• 0000	.0021	.0001		SPAR CENTER
Fŋ	.1000	.0006	.0000	.0020	.0002		GRAZCAN CENTER
							•
SUM	• 9599	•F246	.2016	.0254	.0006	.0969	

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TABLE A-29 ORBITAL CONFIGURATION MODAL SURVEY TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 13A		TEST FREQUENCY = 6.25 HZ.				
COMPONENT	GMC	GM C	GM C	GMC	GM C	GM C
NAME	(BX)	(DY)	(DZ)	(TX)	(TY)	(TZ)
BR/OWS SKIRT/IU/FAS	.0125	. 20 39	. 1834	.(163	•1252	.0007
5-FAS 02 TANKS	.0445	.0141	.1350	0.	Ú.	0 •
MDA/STS/AM	.0005	• °0 36	·19 85	.()21	.0224	.0009
6-AM N2 TANKS	.0006	· 0117	• 95 50	€.	<u>n</u>	0.
COMMAND/SERVICE MOD.	.0010	. 5087	. 11 20	.049	• 90 85	0082
DEPLOYMENT ASSEMBLY	.0024	· 0154	· C564	C •	0.	ŋ •
ATH-RACK, CMGS, 4-SAS	.0108	.0036	.0352	.0000	.0301	.0000
ATM-SPAR CENTER	.0007	. 2000	. 9375	.0003	.2028	0 •
ATM-GRAZCAN CENTER	.8009	.0000	• 30 40	.0302		.0002
SUM	.0737	.0510	.697C	.0137	. 16 3 0	-0017

BR/OWS SKIRT/IU/FAS	• 3319
6-FAS 02 TANKS	•1935
MDA/STS/AM	•1379
6-AM N2 TANKS	• 0574
COMMAND/SERVICE MOD.	•1349
DEPLOYMENT ASSEMBLY	.0741
ATM-RACK, CMGS, 4-SAS	.0497
ATM-SPAR CENTER	.8113
ATM-GRA/CAN CENTER	• 1093

TABLE A-30 GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

	TEST	MUDE	134	RUN NO.	491	FREQUEN	ICY = 6.25
พวกร	GMC	GMC	GMC	GMC	GMC	GMO	NODE
V7.	(אני)	(UA)	(DZ)	(TX)	(TY)	(TZ)	
4		0007	44.07	0005	0747	0005	DAGE ONG COUR OFFEET
1 2	.0000 0301	.0003	.1487 .0919	.0025 .0014	.0713 .0174	.0005	
3	.0793	.0002 0002	.0022	.0024		.0003	IU/FAS INTERFACE
4	0978	.9023	.0257	0.	0.	J.	FAS 02 BOTL1,+Y +Z
5	.0104	.0046	.0300	O •	0 •	0.	FAS 02 30TL2,+Y +Z
F.	.0080	.0033	0255	0 •	0.	0.	FAS 02 30TL3,-Y +Z
7	.0026	.0322	.0192	ŋ.	0.	0.	FAS 02 BOTL4,-Y +Z
શ વ	. 1173	.0004	.0162	0.	0 •	0 •	FAS 02 30TL5,-Y -Z
10	.0083 0000	.0012 .0000	.0183 .0045	0 • 0 •	0. 3.	0 • 0 •	FAS 02 BOTLS, -Y -Z FAS/AM/DA IF, +Y
11	.0031	.0301	.0133	0.	0.	9.	FAS/AM/DA IF, +Z
12	9905	.0705	.0061	0.	0.	0.	FAS/AM/DA IF, -Y
13	.0002	.0002	.0020	9.	0.	0.	FAS/DA IF, -Y -Z
14	• 0 2 3 3	.9918	. C 0 5 5	0.	0.	0.	FAS/AM IF, -7
1 7	.0033	• @ n G 1	.0005	0 •	o •		FAS/04 IF, +Y -Z
15	.0000	.0005	.0254	.0001	.0001		AM TUNNEL/SHEAR WB
17 18	.0000 .0002	.0021 .0000	.0503 .0171	.3614 .0001	.0064 .0066	.0002 .0003	AM TUNNEL/STS IF MDA/STS INTERFACE
1 n	.0302	.0010	.0171	.0001	.0093	.0003	MOA CONEZCYL ITREC
2)	• 0 0 0 0	.0001	.0071	0.	0.	9.	NE TANK + + + LOHER
21	. 2001	.0002	.0097	9.	0.	0.	NE TANK, LY, UPPER
22	.0302	.0001	.0099	0.	0.	0.	N2 TANK, +Z, LOWER
2.3	.0031	.0000	.0122	0.	0.	0.	N2 TANK, +Z, UPPER
24	. 9002	.0007	.0061	J•	0.	0.	NZ TANK -Z, LOWER
25 26	.0001	.0006	.0101 0000	9• 0007	0. 0000	0.	N2 TANK, +Z, UPPER
27 27	.0001 .0001	.0027 .0035	.0000	.0007 .0002	0000 0000	.0000 0000	CM, FWD SJLKHEAD CM, AFT BJLKHEAD
28	.0301	.0015	.0294	. 1106	.0020	0000	SM, FWD BULKHEAD
29	.0007	.0010	.0825	.0035	.0053	0001	SM, AFT BULKHEAD
3.0	.0913	• 0014	.0014	J •	0 •	0.	LOWER D LATCH, DA
31	0000	• 0014	.0195	ŋ .	0.	0.	LOWER +Y TRUNNION
32	.0012	.0123	.0112	3.	9.	0.	LOWER -Y TRUNNION
33 34	0001 .0006	•0102 •0103	.0243 0000	0 • 0 •	0.	0 •	EREP PACKAGE C.G.
35	.0001	0001	• 0021	0.	0 • 0 •	0 • 0 •	ATM PN 5,7 IF, OUTP ATM PN 4,5 IF, OUTR
3.5	.0020	.0001	.0025	0.	0.	0.	ATM PN 8,1 TF, OUTR
37	.0008	.0000	.0125	3.	0 •	9.	ATM PN 2,3 IF, OUTR
7.8	.3004	.0014	0001	0.	0.	0 •	ATM PN 5,7 IF, INNR
₹व	.0037	.0010	.0012	9.	0.	9.	ATM PN 4,5 IF, INNR
49	.0911	.0006	.0019	0.	0.	0.	ATM PN 8,1 IF, INNR
41 42	.0512 .0005	0001 .0001	•0103 •0014		•0030	•0000	ATM PN 2,3 IF, INNR CMG, -Y SIDE
43	0001	.0001	.0002	.0000	.0000	.0000	CMG, +Y SIDE
44	.0001	0000	.0031	. 9000	.0000	.0000	CMG, +X SIDE
45	.0000	.0000	0.	0.	0.	0.	ATM SAS, PN 1
45	.0031	.0001	0.	0.	0.	B •	ATM SAS, PN 3
47	•0000	.0000	0.	0.	0.	0•	ATM SAS, PN 5
4 9 4 9	.0000 .0007	•0000 •0000	0.	. 0003	0.	0.007	ATM SAS, PN 7
E 9	• 0 0 0 7 • 0 0 0 9	.0000	.0075 .0049	.0003 .0002	.0028 .0040		SPAR CENTER GRAZCAN CENTER
-					,		
904	• 9 7 3 7	.0510	•6970	.0137	•1530	.0024	4

TABLE A-31 ORBITAL CONFIGURATION MODAL SURVEY

TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 13	В	TEST	FREQUE	NCY =	5.36 HZ.	
C OMPONE NT	GM C	GM C	GMC	GMC	GM C	GMC
NAME	(DX)	(DY)	(DZ)	(TX)	(TY)	(TZ)
BR/ONS SKIRT/IU/FAS	.0097	.033	. 15 40	.:068	.0974	.0031
6-FAS 02 TANKS	.0336	.0165	.1294	0.	0.	0 •
MDA/STS/AM	.0004	.0021	1880.	.î915	.0203	. CO O 4
6-AM N2 TANKS	• CC 04	. 6014	· 94 13	0.	Ú •	9.
COMMAND/SERVICE MOD.	.0008	. 9925	.2771	.0911	.071	0001
DEPLOYMENT ASSEMBLY	. C6 17	.0135	• 34 45	0.	ů•	0.
ATH-RACK, CHGS, 4-SAS	.0081	.0321	.0276	.0300	.6300	.0000
ATH-SPAR CENTER	.0006	. 9980	.0052	.0081	.0924	0.
ATM-GRA/CAN CENTER	.0006	.0000	. 10 35	.0301	.6034	.8362
SUM	.0560	.0415	.7615	•0396	.1307	.0397

BR/OWS SKIRT/IU/FAS	.2713
6-FAS 02 TANKS	.1734
MDA/STS/AM	.1127
6-AM N2 TANKS	.0431
COMMAND/SERVICE MOD.	.2886
DEPLOYMENT ASSEMBLY	.0597
ATM-RACK, CMGS, 4-SAS	• 9379
ATM-SPAR CENTER	.9684
ATH-GRA/CAN CENTER	.0078

TABLE A-32 GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF ERESOON

	1551	. AUDĒ	138	PUN NO.	557	FREQUENC	CY = 6.35
430F 40.	GMC (NX)	SMC (DY)	GMC (D7)	GMC (TX)	SMC (TY)	GMC (TZ)	
1	.3000	0000	. 1247	.0017	. ពួកគុគ	.0001	BASE RNG/JWS SKIPT
י	9901	.0002	.0023	.0016			DWS/IU INTERFACE
7	.0003	.0003	0001	. 3035	. 3274		UZFAS INTERFACE
4	.0755	.0039	.0117	9.	0.		AS 02 BOTL1,+Y +Z
2	• 1085	•0082	.0189	ð.	0.		FAS DE BOTLE,+Y +Z
F,	. 1957	• 00 0 4	.0265	J.	J •		FAS 02 BOTL3,-Y +Z
7	.0024	.0006	.0265	0 •	o •		FAS 02 BOTL4,~Y +Z
Ŗ	• 3743	.0710	· 6182	J.	0 •		FAS 02 30TLF,-Y -Z
d	.9071	•0023	.0194	0.	0 •		45 02 30TL6,-Y -Z
1.0	9993	• 4500	. 00 22	0.	<u> </u>		FAS/AM/DA IF, +Y
1.1	.0070	.0002	.0111	9.	0.	0.	FAS/AM/DA IF, +Z
12	.0102	.0003	.0074	3.	ŋ .		FAS/AM/74 IF, -Y
13	.0001	.0105	.0022	0.	0 •		FAS/DA IF, -Y -Z
14	.0020	.0017	. 9949	3.	0.	0. 5	FAS/AM TF, -Z
15	. 7002	.0001	.0002	0.	J.		FAS/DA TF, +Y -Z
15	.0000	. 2004					AM TUNNEL/SHEAR WB
17 19	.1000 .1002	.0014 .0002		.3311	.0055	•0001	AM TUNNEL/STS IF
	.0002	.0002	.0102 .0150	.0001 .0093	• 3070 • 0077		MDA/STS INTERFACE MDA CONE/CYL ITREC
1 3 20	.0000	.0000	.0051	0.	0.		V2 TANK, +Y, LOWER
? 1	.0001	.7001	.0066	₫.	0 •		12 TANK, +Y, UPPER
3,2	.0301	.0000	.0074	0.	0.		NZ TANK, +Z, LOWER
23	. 0 0 0 0	.0000	0096	3.	0.		NZ TANK, +Z, UPPER
24	.0001	.0007	.0048	ŭ.	9.		NE TANK -7, LOWER
2 =	.0001	.0106	.0077	0.	0.		12 TANK, -Z, UPPER
25	.0001	.0007		. 3004			CM, FAD BULKHEAD
27	.0000	.0013	.1101	. 3000	0002		CM, AFT BULKHEAD
29	• • • • • •	.0002	.0312	0001	.0025	.0000	SM, FWD BULKHEAD
23	• 0 0 0 8	•9003	.0564	• 96 98	• 0049		SM, AFT BJLKHEAD
30	. 1997	.0015	.0013	0 •	0.		LOWER D LATCH, DA
31	0000	.0017	.0127	0 •	0•		LOWER +Y TRUNNION
₹2	.0010	.0102	.0088	3 •	0.		LOWER -Y TRUNNION
33	-•0000	.0001	.0217	0•	0.		EREP PACKAGE D.G.
34	.0004	.0001	0000	3.	0.		ATH PN 6,7 IF, DUTR
75	.0702		.0015	9•	0.		ATM PN 4,5 IF, OUTR
35	.0714	.0001	.0020	0•	0.		ATH PN 8,1 TF, OUTR
77		0000		J.	0.		ATM PN 2,3 IF, OUTR
₹ <u>8</u>	.0004	.0008	0000	3.	0.		ATM PN 5,7 IF, INNR
39	.0026	.0005	.0009	0.	0.		ATM PN 4,5 IF, INNR
43	.0309	•0004	.0017	0.	0.		ATM PN 8,1 IF, INNR
41 42	.0009 .0003	0001	.0081	0.	0.		ATM PN 2,3 IF, INNR
4 Z	.0003	•0000 •0001	.0011 .0002	.0000	•0000	.0000 .0000	CMG, -Y SIDE
44	.3031	0000	.0024	.3000	.0000 .0000		CMG, +X SIDE
45	.0000	.0000	0.0024	0.	0.		ATM SAS, PN 1
45	.0001	.0001	n.	0.	0.		ATM SAS, PN 3
47	.0000	.0000	0.	0.	0.		ATM SAS, PN 5
49	.0000	.0100	0.	0.	0.		ATH SAS, PN 7
49	.0006	.0000	.0052	.0001	.0024	.0006	SPAR CENTER
E J	.0005	.0000	.0035	.0001	.3834		GRAZCAN CENTER
SUM	.0560	.0415	.7615	.0096	•1307	.0013	

TABLE A-33 ORBITAL CONFIGURATION MODAL SURVEY

TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 144	ı	TEST	FREQUE	NCY =	6.73 HZ.	
COMPONENT	GM C	GM C	GM C	GMC	GM C	GMC
NAME	(DX)	(DY)	(DZ)	(TX)	(TY)	(TZ)
3R/OWS SKIRT/IU/FAS	.CC16	.0557	.1169	.:398	.0020	.6255
5-FAS 02 TANKS	· 01 25	25 77	.2102	9•	G •	3 -
MDA/STS/AM	.0031	.0336	.0058	.0002	.0006	•0299
5-AM N2 TANKS	.0026	.6231	• 31 95	G.	С.	0.
COMMAND/SERVICE MOD.	.0019	• 35 34	. 31 44	.0307	.0987	•6038
DEPLOYMENT ASSEMBLY	.0081	.0502	• 90 43	0.	3.	0 •
ATM-RACK, CMGS, 4-SAS	.0073	. 21.46	.0056	.000	0000	.0000
ATM-SPAR CENTER	.0000	.0002	• 9300	.0026	.0091	0 -
ATM-GRAZCAN CENTER	• 60 66	.0304	.9335	.[724	.5001	.8819
SUM	.0341	•489C	• 36 66	.0457	.ED35	.0511

BR/OWS SKIRT/IU/FAS	. 2416
6-FAS 02 TANKS	• 4893
MDA/STS/AM	.0702
6-AM N2 TANKS	• 3352
COMMAND/SERVICE MOD.	.8749
DEPLOYMENT ASSEMBLY	.3625
ATM-RACK, CMGS, 4-SAS	.0276
ATM-SPAR CENTER	.0030
ATM-GRA/CAN CENTER	.0048

TABLE A-34 GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

	1551	MODE	144	20N NO.	474	FREQUENCY = 5.73
ио. ИЭП <u>Е</u>	940 (nx)	GMC (DY)	GMC (D7)	GMC (TX)	GMC (TY)	GMC NODE (TZ) DESCRIPTION
	(nx) • 0 0 0 0				(TY) .00080006 .0019 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.	
22737337773744444444 201737377737444444444 501777777777777777777777777777777777777	- 0019 - 0020 - 0020 - 0020 - 0020 - 0012 - 0012 - 0012 - 0012 - 0010 - 0002 - 0001 - 0001 - 0001 - 0001 - 0000 -	.0158 .01390 .01390 .001390 .001390 .001390 .00111 .0000 .00	.0010 .0027 .0000 .0035 0003 .0010 .0002 .0012 .0012 .0002 .0005 .0005 .0005 .0005 .0005 .0005 .0005 .0005	00005 0005 00005 0000 0000 0000 0000 0	.0002 .0065 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.	0003 SM, FWD BJLKHEAD .0020 SM, AFT BJLKHEAD 0. LOWER D LATCH, DA 1.0WER +Y TRUNNION 0. LOWER -Y TRUNNION 0. EREP PACKAGE C.G. 0. ATM PN 5,7 IF, OUTR 0. ATM PN 8,1 IF, OUTR 0. ATM PN 8,1 IF, OUTR 0. ATM PN 8,1 IF, INNR 0. ATM SAS, PN 5 0. ATM SAS, PN 3 0. ATM SAS, PN 5 0. ATM SAS, PN 7 .0000 SPAR CENTER .0019 GRAZCAN CENTER

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TABLE A-35 ORBITAL CONFIGURATION MODAL SURVEY

TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 15	7	TES.	T FREQUE	NCY =	7.59 HZ.	
C OMPONE NT	GMC	GMC	GM C	GMC	GM C	GMC
NAME	(BX)	(DY)	(DZ)	(TX)	(TY)	(TZ)
9R/OWS SKIRT/IU/FAS	.6021	. 3377	.0155	.[143	.0002	.0039
6-FAS 02 TANKS	.0120	.0935	• 1186	€.	9.	0 •
MDA/STS/AM	.0030	.0500	.0032	.CJ08	.0000	.0029
6-AM N2 TANKS	-0001	.0188	. 73 85	U •	C •	9.
COMMAND/SERVICE MOD.	.0006	.0291	.0171	.()36	.6334	.018
DEPLOYMENT ASSEMBLY	.0015	.9171	.0351	0.	0.	0.
ATM-RACK, CMGS, 4-SAS	.0147	.2018	• 17 94	.6913	.0300	.6081
ATH-SPAR CENTER	.0003	.9913	00 00	• 666	.0012	3 •
ATM-GRAZCAN CENTER	.0001	.0006	3000	• [876	.00 9 4	.0061
SUM	.0315	. 4499	. 33 04	.1712	.0023	.6147

TOTAL GM CONTRIBUTION FOR EACH COMPONENT

BR/OWS SKIPT/IU/FAS	.0747
6-FAS 02 TANKS	.2242
MDA/STS/AM	.0540
6-AM N2 TANKS	.0194
COMMAND/SERVICE MOD.	.0426
DEPLOYMENT ASSEMBLY	.0236
ATM-RACK, CMGS, 4-SAS	• 397 3
ATM-SPAR CENTER	.0695
ATM-GRA/CAN CENTER	. 1948

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TABLE A-36 GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

TEST MODE 15A RUN NO. 600 FREQUENCY = 7.59

	1.231	,	15 A	- C 14 1417	503	FREQUE	101 = 7.99
450c	SMC	GMC	GMC (DZ)	GMC (TX)	GMC	GMC	
40.	(אָרי)	(DY)	(02)	(12)	(TY)	(TZ)	DESCRIPTION
1	.0001	.0202	.0033	.0022	·00J1	.0010	BASE RNG/OWS SKIPT
2	0000	.0004	.0024	.0039	3030		OWS/IU INTERFACE
3	.3000	.0002	.0059	.0082	.0002	.0019	IU/FAS INTERFACE
4	0003	.0051	.0314	0 • •	Ū •	0.	FAS 02 BOTL1,+Y +Z
=	. 0 045	.0712	.0233	າ•	0.	9 •	FAS 02 BOTL2,+Y +Z
5	. 3026	.0144	.0119	9.	0 •	0.	FAS 02 90TL3,-Y +Z
7	.0713	.0009	• 0412	0.	C •	0.	FAS 02 30TL4,-Y +Z
뭐 그	.0911	.0462	.0068	0.	0.	0.	FAS 02 90TL5,-Y -Z
	.0027 .0003	.0257 .0039	.0041 .0009	0. 0.	0. 0.	0. 3.	FAS 02 BOTL5,-Y -Z FAS/AM/DA IF, +Y
17 11	.0003	.0039	.0003	0.	0.	3.	FAS/AM/DA IF, +Z
12	.0013	•0187	.0037	0.	0.	0.	FAS/AM/DA TF, -Y
13	. 0000	•000 €	.0002	0.	0.	0.	FAS/DA IF, -Y -Z
14	.0000	.0096	.0002	3.	9.	0.	FAS/AM IF, -7
15	.0000	.0001	0000	3.	0 •	0.	FAS/DA IF, +Y -Z
15	.0000	.0165	.0000	.0000	•0000		AM TUNNEL/SHEAR WB
17	.0000	. 1227	.0001	.0001	.0000	.0016	AM TUNNELISTS IF
18	.0000	.0107	0000	• 00 06	•0000	0004	
12	? 0 0 3	.0001	.0061	•0000	•9090		MOA CONE/CYL ITREC.
20	0000	.0059	.0001	0 •	0 •	0.	N2 TANK, +Y, LOWER
?1	.0001	.0054	.0000	0.	0.	0.	NZ TANK, +Y, JPPER
2.3 2.3	. 0 9 9 9	.0001 .0009	.0000 .0001	0. 0.	Մ•	0. 0.	N2 TANK, +Z, LOWER N2 TANK, +7, UPPER
24	.0000 .0000	.0033	• 0002	0.	0.	0.	NE TANK -Z, LOWER
2 4 2 5	•0000	• 00 33 • 00 33	.0001	0.	9.	0.	N2 TANK, -Z, UPPER
25	.0000	.0087	.0015	0000	0900	0000	CM, FWD BULKHEAD
27	.0000	.0090	.0347	0000	0000		CM, AFT BULKHEAD
29	0100	.0017	.0005	.0000	.0000	.0000	SM, FWD BULKHEAD
5.3	•0075	. ୮୩୩୫	.0033	.0006	.0934	·0017	SM, AFT BULKHEAD
<u>s</u> u	.0001	• 1037	.0004	0.	0 •	0.	LOWER D LATCH, DA
31	•000B	• 0004	.0327	0.	0 •	0 •	LOWER +Y TRUNNION
3?	.000?	0003	.0012	0.	0 •	0.	LOWER -Y TRUNNION
33	.0705	.0133	0007	j.	0 •	0.	EREP PACKAGE C.G.
74 70	.7001	.0005	.0044	3.	0.	0.	ATM PN 6,7 IF, OUTR
76	.0009 .0011	.0024 .0039	.0415 .0510	3. C.	0.	0.	ATM PN 4,5 IF, OUTR ATM PN 8,1 IF, OUTR
7.7 7.7	.0012	.0089	.0022	0.	0.	J.	ATM PN 2,3 IF, OUTR
₹8	.0912	.0862	.0044	0.	0 •	0.	ATM PN 5,7 IF, INNR
70	.0016	0205	0153	Ü.	0.	9.	ATM PN 4,5 IF, INNR
4.0	0004	.0095	.0303	0.	0.	3.	ATM PN 3,1 TF, INNR
41	0003	.0439	.0021	0.	0 •	0 •	ATM PN 2,3 IF, INNR
42	.0002	.0065	•û125	.0004	.0000	.0000	CMG, -Y SIDE
63	. 0004	.0966	.0150	.0006	0000	.0000	CMG, +Y SIDE
44	.0000	.0056	• 0005	•0003	•000C		CMG, +X STDE
45	.0028	.0028	0.	ĵ.	0 •	0.	ATM SAS, PN 1
45	.0013	.0013	0.	9.	0.	0.	ATM SAS, PN 3
47	.0025	.0025	0.	0.	0.	0.	ATM SAS, PN 5
4 B 4 O	.0705 .0003	.0005 .0013	0. 0000	ე. • ე665	0. .0012	.0003	ATM SAS, PN 7 Spar center
F)	.0003	.0013	• 0000	0876	.0012		GRAZCAN CENTER
. ,				7			
7 JM	.0315	.4499	.3304	.1712	.0923	.015	0

TABLE A-37 ORBITAL CONFIGURATION MODAL SURVEY

TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 16/	TEST FREQUENCY = 8.85 HZ.					
C OMPONE NT	GMC	GM C	GM C	GMC	GM C	GMC
NAME	(DX)	(DY)	(DZ)	(XX)	(TY)	(TZ)
BR/OWS SKIRT/IU/FAS	.1359	. 00 37	. 99 84	.0006	.2013	.0002
5-FAS 02 TANKS	• 1466	.0056	.0210	C •	9 •	0.
MDA/STS/AM	.0021	.0009	.0316	.0301	.0092	.0001
6-AM N2 TANKS	. 0040	.0004	.0013	C •	0.	0.
COMMAND/ SERVICE MOD.	.5776	.6312	.0012	. () 2 3	0001	.0510
DEPLOYMENT ASSEMBLY	.0111	.0014	. 1075	0•	C •	0.
ATM-RACK, CMGS, 4-SAS	.0016	.0006	.0315	.0000	.0000	.0080
ATM-SPAR CENTER	. 0000	.0000	. 33 00	.6331	· C0 0 7	9.
ATM-GRA/CAN CENTER	.0100	.6906	.0301	.0001	. 50 0 7	.0050
SUM	.8781	.0139	.0427	.0912	.0029	.0513

BR/OWS SKIRT/IU/FAS	.1492
6-FAS 02 TANKS	•1732
MDA/STS/AM	.0049
6-AM N2 TANKS	.0057
COMMAND/SERVICE MOD.	.6413
DEPLOYMENT ASSEMBLY	.0298
ATM-RACK, CMGS, 4-SAS	• 0 7 3 8
ATM-SPAR CENTER	.0009
ATM-GRA/CAN CENTER	.0009

TABLE A-38 GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

	TEST	ADUE	16 A	7UN NO.	347	FREQUEN	CY = 8.85
ирп <u>т</u> мо.	GMC (NX)	GMC (DY)	64C (D7)	GMC (TX)	GMC (TY)	GMC (TZ)	
1	• 0758	.0004	.0042	.0000	.0005	.0001	PASE RNG/DWS SKIRT
2	.0215	.0004	.0012		.0005		OWS/IU INTERFACE
3	.0234	.0010	.0021	.0004	.0002		IU/FAS INTERFACE
4	.0177	•0003	0000	C •	0.	0 •	FAS 02 30TL1,+Y +Z
5	.0282	.0811	.0011	0.	3.	J.	FAS 02 BOTL2,+Y +Z
5	.0202	.0009	0000	C •	0.	o •	FAS 02 30TL3,-Y +Z
7	.0254	.0007	.0031	0.	0 •		FAS 02 BOTL4, +Y +Z
q	• U 3 K 3	.0020	.0128	0.	0.	0.	FAS 02 30TL5,-Y -Z
1	.0174	.0005	.0039	9.	0 •	0.	FAS 02 BOTL6,-Y -Z
17	.0027	.7081	0000	3.	0.	9.	FAS/AM/DA IF, +Y
11 12	.0043 .0044	.9902 .0008	.0003 .0000	0.	0 • 0 •	0. 9.	FAS/AM/DA IF, +7 FAS/AM/DA IF, -Y
13	0004	.0000	• 00 05	3. 3.	0.	3.	FAS/DA IF, -Y -Z
44	.0013	•0002 •0005	.0003	3.	0.	0.	FAS/AM IF, -Z
1=	.0007	.2201	.0000	0.	0.	0.	FAS/74 IF, +Y -Z
15	.0007	.0000	.0005	• ၁၁၁٥	• 2009		AM TUNNEL/SHEAR WB
17	•0000	. 2200	•000B	.0000	.0001	.0000	
13	. 0 0 0 5	• 3 0 0 3	.0003	. 2000	.0000	.0000	
19	.0008	• 40 05	.0000	• 30 30	.0001	.0000	
20	• 0 0 0 8	• 60 0 0	• 0000	9.	0 •	0.	N2 TANK, +Y, LOWER
21	.0005	•0000	.0000	0.	0.	0.	NZ TANK, KY, UPPER
22 ?*	.1006 .0911	.0000 .0000	.0007 .0005	0. 0.	0. 0.	0 • 9 •	NZ TANK, +Z, LOWER NZ TANK, +Z, UPPER
24	.0005	.0003	• 0000	0.	0.	0.	N2 TANK -7, LOWER
5=	2705	.0001	.0000	0.	0.	3.	NE TANK, -Z, UPPER
26	0538	.0008		.0001	-		CM, FWD BULKHEAD
?"	.0521	0000	. 0000	.0000	0003	.0004	
28	. 2325	• 0004	• 0000	.0002	0004	.0593	SM, FWD BULKHEAD
5.3	. 2292	• 0 0 0 0	.0002	•0000	•0002		SM, AFT BULKHEAD
3.j	•9°45	.0002	~ 0001	0.	0.	3 ·	LOWER D LAYOH, DA
31 32	.0037 .0033	.0006 .0005	0001 .0001	0. 0.	0• 0•	0 • 0 •	LOWER +Y TRUNNION LOWER -Y TRUNNION
उ <u>ट</u> हर	0001	.0005	.0075	ŋ•	0.	0.	EPEP PACKAGE C.G.
34	.0000	0000	.0005	0.	0.	0.	ATM PN 6,7 IF, OUTR
35	0000	.0000	.0002	3.	0.	0.	ATM PN 4,5 IF, OUTR
36	0000	0900	.0000	0.	0.	9.	ATM PV 8,1 IF, OUTR
77	.0000	.0000	.0001	0.	0.	0.	ATM PN 2,3 IF, OUTP
38	.0001	•0000	.0004	J •	0 •	0 •	ATM PN 5,7 IF, INNR
રુવ	.0002	@n @ O	.0901	0.	0.	0.	ATM PN 4,5 IF, INNR
40	.6334	•0300	.0000	0 •	_	. 3 •	ATM PN 8,1 TF, INNR
41	.0002	0000	.0001	0.	9.	0.	ATM PV 2,3 IF, INNR
42 43	.0000 .0001	0000	.0000	.0000	•0000	•0000	CMG, -Y SIDE
44	.0001	.0000 0000	.0000 .0000	.0000 0000	.0000 .0000		CMG, +Y SIDE CMG, +X SIDE
45	.0001	.0000	0.	0.	0.000	0.	ATM SAS, PN 1
46	.0000	.0000	0.	0.	0.	0.	ATM SAS, PN 3
47	.0004	.0004	0.	0.	0.	0.	ATM SAS, PN 5
4.9	.0000	.0000	0.	0.	0.	0 -	ATM \$45, PN 7
49	• 9 0 8 8	.0000	.0000	.0001	.0007	.0000	SPAR CENTER
Εŋ	.0000	.0000	.0001	.0001	•0007	.0000	GRAZCAN CENTER
\$ UM	.8781	.0139	.0427	.0012	.0029		-

TABLE A-39 ORBITAL CONFIGURATION MODAL SURVEY TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 17A TEST FREQUENCY = 11.59 HZ.

C OM PONE NT	GNC	GMC	GM C	GM C	GMC	GMC
NAME	(DX)	(OY)	(DZ)	(TX)	(YY)	(TZ)
9R/OWS SKIRT/IU/FAS	0003	.0318	.0130	.(112	- 0944	.0044
6-FAS 02 TANKS	.0012	• 2412	.3261	0.	3 •	0 •
MDA/STS/AM	.0001	.1013	. 00 84	•û169	.0301	0003
6-AM N2 TANKS	.0816	. 3932	•0259	0.	C.	0.
COMMAND/SERVICE MOD.	.0001	. 1191	. 20 44	.0302	. (004	.3013
DEPLOYMENT ASSEMBLY	0011	. 6943	.0041	€.	0.	0.
ATM-RACK, CMGS, 4-SAS	.0015	.0017	.0015	.6306	.0000	.0000
ATM-SPAR CENTER	.0002	.0002	.0002	.0305	.0001	0.
ATM-GRA/CAN CENTER	.0000	.0800	.0061	•0107	.6001	.0002
SUM	.0033	• 58 3r	• 38 38	.0195	.0050	•0055

BR/OWS SKIRT/IU/FAS	.0544
6-FAS 02 TANKS	• 56 85
MDA/STS/AM	• 126 5
6-AM N2 TAWKS	.1238
COMMAND/SERVICE MOD.	.0256
DEPLOYMENT ASSEMBLY	.0973
ATM-RACK, CMGS, 4-SAS	.9647
ATM-SPAR CENTER	.0012
ATH-GRA/CAM CENTER	.0010

TABLE A-40 GENERALITED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

	TEST	. 400E	17 4	PUN NO.	549	FREQUEN	ICY = 11.59
พวกร	<mark></mark> ይዛሶ	GMC	CAC	CMC	CMC	CHC	NORE
40.	(DX)	(04)	GMC (DZ)	GMC (TX)	(TY)	(T71	NODE Description
4.7	(30)	(01)	(15)	(12)	(117	(12)	0130KIF 113N
1	.0001	.0012	.0003	.0006	.0022	.6013	BASE RNG/DWS SKIRT
?	• 0000	.0358	.9061	.0001	• 0n35		OWS/IU INTERFACE
3	• 0000	.0117	• CO B B	.0006	.0016	•0034	IU/FAS INTERFACE
4	.0002	• 0 ⁷ 97	0575	บิ •	0.	0 •	FAS 02 80TL1,+Y +Z
5	.0001	• 00 05	.0415	J •	J •	0.	FAS 02 30TL2,+Y +Z
e T	• 0 7 0 9	• 5337	. 1508	ŋ.	0.	0.	FAS 02 BOTL3,-Y +Z
	-• ຑ຺ຉຉ຺	.1F06	.0581	0.	0 •		FAS 02 BOTL4,-Y +Z
9. G	0101	.0984	.0077	0.	0.	0.	FAS 02 30TL5,-Y -Z
	-1892 0097	.0964 .0916	.0004 0001	0. 0.	0. 0.	0 • 0 •	FAS 02 301L5,-Y -Z
1 0 11	.0001		.0001	0. 0.	3.		FAS/AM/DA IF, +Y FAS/AM/DA IF, +Z
17	gggz	.0016	.0117	0.	j.	0.	FAS/AM/DA IF, -Y
1 7	3030	.7010	00 05	0.	0.	3.	FAS/DA IF, -Y -Z
14	.0001		.0002	3.	0.	0.	FAS/AM IF, -Z
45	.0003		.0013	J.	0 -	n .	FAS/14 TF. +Y -7
î.s	• 3360	.0249	.0018	. 3914	.0000	.0001	AM TUNNEL/SHEAR WS
17	• 0 0 0 3	.0234	.0009	• 3640	0000	.0094	AM TUNNELISTS IF
18	.0000	.0350	.0026	• Of 71	.0011	0010	MDA/STS INTERFACE
19	• 7709	.0181	.0031	. 9644	.0000	.0002	MDA CONE/CYL ITREC
21	. 3791	.0521	• 001ª	ů•	0 •	0 •	N2 TANK, +Y, LOWER
21	•0019	.0253	.0014	0 •	0.	3.	N2 TANK, +Y, UPPER
22	• ១១១១	.0014	.0143	0.	0.	0 •	N2 TANK, +7, LOWER
23	• 1003	.0028	.0034	3.	0.	0.	N2 TANK, +Z, UPPER
24	.0561	.0009	.0035	0.	0.	ĵ.	N2 TANK -Z, LOWER
? 5	.000?	.0007	.0013	0.22	0.0004	0.007	N2 TANK, -Z, UPPER
26 2₹	.0000	.0000 .0097	.0081 .0036	.0002 0000	0003	•0005	CM, FWD BULKHEAD
28	.0000 .0001	• 0097		.0000	- 9002	.0000	CM, AFT BULKHEAD SM, EWO BULKHEAD
29))))	.0087			.0601		SM, AFT BULKHEAD
3.3	• 3035	0973	.0002	0.	0.	0.	LOWER D LATCH, DA
71	0132	0524	.0038	ð.	j.	9.	LOWER +Y TRUNNTON
32	. 5 2 6 8	.0328	0013	ŋ.	0.	0.	LOWER -Y FRUNNION
33	• 3 2 0 9	.0065	.0011	8 •	0 •	0 •	EREP PACKAGE C.G.
34	.0000	.0001	.0001	0 •	0.	9 •	ATM PN 6,7 IF, OUTR
32	•0003	• 0000	.0002	0.	0.	0.	ATM PN 4,5 IF, OUTR
36	•0008	•0000	.0004	9.	0.	J .	ATM PN 8,1 IF, OUTR
37	.0301	.0002	.0001	ũ•	0.	0.	ATM PN 2,3 IF, OUTR
3.0 3.0		.0009				9•	ATH PN 6,7 IF, INNR
33	•0000	.0001	.0000	3.	0.	g.	ATM PN 4,5 IF, INNR
4 <u>0</u> 41	.0004	3000 .0001	.0004 .0001	0. 0.	0 • 0 •	3. 8.	ATM PN 8,1 IF, INNR ATM PN 2,3 IF, INNR
42	•0001 •0000	.0000	.0000	.3000	.0000	.0000	CMG, -Y SIDE
43	.0000	.0000	.0001	.0000	.0000	.0000	CMG, +Y SIDE
44	.3303	.0000	.0001	.0000	.0000	.0000	CMG, +X SIDE
45	.0001	.0001	0.	9.	0.	0.	ATM SAS, PN 1
46	.0000	.0000	0.	0.	0.	0.	ATM SAS, PN 3
47	. 2000	.0000	0.	0 •	0.	0 •	ATM SAS, PN 5
49	.9001	.0001	0.	o •	O•	0.	ATM SAS, PN 7
r o	.0702	.0002	.0002	.0005	.0001		SPAR CENTER
F ()	.0000	.0000	.0001	.0007	.0001		GRAZCAN CENTER
SUM	.0033	.5830	.3838	.0195	.C050	.0056	

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TABLE A-41 ORBITAL CONFIGURATION MODAL SURVEY TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 18A TEST FREQUENCY = 12.65 HZ.

COMPONENT	GM C	GMC	GM C	GMC	GM C	GMC
NAME	(ŊX)	(DY)	(DZ)	(TX)	(TY)	(TZ)
BR/OWS SKIRT/IU/FAS	.0000	.0075	. 21 15	.0865	.0005	.0003
6-FAS 02 TANKS	• 0306	. 3202	.0155	C •	û •	0 •
MDA/STS/AM	. CO 0 4	0068	.3315	•6722	.0003	• i 0 1 0
5-AM N2 TANKS	.0093	.0345	.0383	₽.	0.	o .
COMMAND/SERVICE MOD.	.0000	.3359	.0016	.0693	.1004	0000
DEPLOYMENT ASSEMBLY	.0005	• 3356	. 9853	e •	9.	0 •
ATM-RACK, CMGS, 4-SAS	.6001	.0303	.0002	3000.	.000	.6000
ATH-SPAR CENTER	.0000	• 0000	.0000	.0391	.0000	0.
ATM-GRAZCAN CENTER	.0000	.0001	.0008	.0301	.0301	.0000
SUM	.0320	• 2723	.0739	.8192	.0013	.0013

BR/OWS SKIRT/IU/FAS	.1063
6-FAS 02 TANKS	.0663
MDA/STS/AM	•6744
6-AM N2 TAWKS	.0731
COMMAND/SERVICE MOD.	.0673
DEPLOYMENT ASSEMBLY	.0114
ATM-RACK, CMGS, 4-SAS	.0036
ATM-SPAR CENTER	.0002
ATY-GRA/CAN CENTER	.0003

TABLE A-42 SENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

TEST MODE 18A RUN NO. 526 FREQUENCY = 12.65

	,		100		520	1 ((1,120)	
N005	GMD (DX)	GMC (DY)	GMC (DZ)	GMC (TX)	SMC (TY)	GMC	
N U.	(())	(91)	(112)	(17)	(11)	(TZ)	DESCRIPTION
1	• 3003	.0002	.0001	.0509	.0003	.0003	BASE RNG/DHS SKIRT
2	. ღიცე	.0002	.0002	.0104	0000		OWS/IU INTERFACE
3	0000	.0002	.0035	.0152	.0002	.0000	IU/FAS INTERFACE
4	.0018	.0065	• G051	9.	ŋ •	0 •	FAS 02 BOTL1,+Y +Z
5	.0103	.0018	.0013	0.	0 •	0.	FAS 02 BOTL2,+Y +Z
<u>ج</u>	.0051	.0041	.0021	0.	0.	0.	FAS 02 BOTL3,-Y +Z
8	•9051 •0055	.0025 .0023	.0921 .0003	0.	0 • 0 •	0 • 0 •	FAS 02 BOTL4,-Y +Z FAS 02 BOTL5,-Y -Z
a	• 0 0 0 0 0 7 • 0 0 1 7	.0030	.0045	0.	0.	0.	FAS 02 BOTL6,-Y -Z
10	0000	.0001	.0019	3.	8.	0.	FAS/AM/DA IF, +Y
11	.0000	.0048	0000	0.	0.	j.	FAS/AM/DA IF, +Z
12	0 ომე	.0000	.0051	ប •	0 •	9 •	FAS/AM/DA IF, -Y
13	.0000	0000	0000	0.	0 •	0 •	FAS/DA IF, -Y -Z
14	• 3300	.0018	.0004	0.	0.	J •	FAS/AM IF, -Z
15	. 9000	.0702	.0002	0.	0.	0.	FAS/) A IF, +Y -Z
15 17	.0001	.0000	.0002	.0448 .1749	.0002		AM TUNNEL/SHEAR WE
1 4	.0003 .0000	.9004 0006	.0001 .0011	.2504	.0000 0000	.0002 000C	AM TUNNEL/STS IF MDA/STS INTERFACE
19	.0000	0000	.0001	.2021	.0001	.0001	
21	.0703	.0004	.0018	0.	0.	0.	NZ TANK, +Y, LOWER
21	.0002	.0001	.0153	0.	0.	0 •	NZ TANK, FY, JPPER
. 22	.0000	•0008	0204	0 .	0 •	0 •	N2 TANK, +Z, LOWER
?3	.0000	.0117	.0002	0.	0.	0.	N2 TANK, +Z, UPPER
24	.0000	.0010	.0065	0.	0.	0.	NZ TANK -Z, LOWER
25 25	.1001	.0205	.0001	0. .ეც56	0. .0000	0.000	N2 TANK, -Z, UPPER
27	.9000 .9900	.0023 .0019	.0001 .0000	.0025	0000	0000	CM, FWD RULKHEAD CM, AFT BULKHEAD
28	• 0000	.0005	.0000	• J182	.0001	0000	SM, FWD BULKHEAD
29	. 1000	.0003	.0014	. 3341	.0053	0000	SM, AFT BULKHEAD
30	• 0 1 0 3	0001	0000	J.	0.	0•	LOWER D LATCH, DA
31	.1000	• 9000	.0043	3.	0 •	G •	LOWER +Y TRUNNION
۲?	0001	. 1045	.0010	9 •	0.	0 •	LOWER -Y TRUNNION
33	.0003	.0712	.0000	0.	0.	0 •	EREP PACKAGE G.G.
34 35	•0000 •0000	.0000 .0000	•0000 •0001	0• 0•	0. 0.	0 • 0 •	ATM PN 6,7 IF, OUTR
3.6	.0000	.0000	.0000	0.	0.	0.	ATM PN 8,1 IF, OUTR
27	.0000	.0000	.0000	ő.	0.	0.	ATM PN 2,3 IF, DUTR
₹ 8	.0800	.0002	.0000	0.	0 •	0 •	ATM PN 5,7 IF, INNR
žα	.0000	.0000	. 8000	9•	0 •	0 •	ATM PN 4,5 IF, INNR
4)	• 3003	.0000	.0000	9.	0 •	ŷ •	ATM PN 8,1 IF, INNR
41	0000	.0000	.0000	∂•	0.	0.	ATM PN 2.3 IF, INNR
42 43	•0000 •0000	.0000 .0000	• 00 00 • 00 00	.0000 .0000	0000 0000	0000	CMG, -Y SIDE CMG, +Y SIDE
44	• 9 9 9 9	.0000	• 0000	• 0 0 0 0	•0000	.0000	CMC, +X SIDE
45	.0000	.0000	0.	3.	0.	0.	ATM SAS, PN 1
4.5	.0000	.0000	0.	0.	0.	8.	ATM SAS, PN 3
47	.0000	• 0000	0.	G •	0.	0.	ATM SAS, PN 5
4 A	0000	0000	0.	0.	0 •	0.	ATM SAS, PN 7
49	.0000	.0000	.0000	.0001	.0000		SPAR DENTER
÷0	• 0 0 0 0	.0001	.0000	.3601	.0001	.0000	GRAZDAN CENTER
KI) 2	. 7720	.0723	• 9739		.0013		

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TABLE A-43 ORBITAL CONFIGURATION MODAL SURVEY TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 188 TEST FREQUENCY = 12.87 HZ. GMC COMPONENT GMC GM C GMC GM C GHC NAME (nx) (YC) (DZ) (TX) (TY) (TZ) .0173 .6185 . (536 .0001 .0013 .0008 BR/OWS SKIRT/IU/FAS . 33 96 6-FAS 02 TANKS .0240 €. J . · J176 0. .0009 .0004 MDA/STS/AM . 9407 ·5413 ...338 .0102 .0248 ŋ., €. 6-AM N2 TANKS .0004 . 1926 0. COMMAND/SERVICE MOD. .0011 .0116 . (336 .0004 . 7644 .C036 0. 0. DEPLOYMENT ASSEMBLY .0014 .0131 .9157 0. .0000 ATM-RACK, CMGS, 4-SAS .0000 .9901 .9301 .0000 .0000 ATM-SPAR CENTER .0000 .0000 . 22 20 .C30U . (0)2 .0000 ATM-GRAZCAN CENTER .0000 .0000 •0230 .0001 .0002 ----

TOTAL GM CONTRIBUTION FOR EACH COMPONENT

. 2459

.0812

.6278

.0329

.0147

.0276

SUM

BR/OWS SKIRT/IU/FAS	.3810
6-FAS 02 TANKS	.0512
MDA/STS/AM	•5943
6-AM N2 TANKS	.1278
COMMAND/SERVICE MOD.	.1147
DEPLOYMENT ASSEMBLY	.0302
ATM-RACK, CMGS, 4-SAS	.DC 01
ATM-SPAR CENTER	.0003
ATH-GRA/CAN CENTER	.0033

TABLE A-44 GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

	१ ड्डर	אספב	18 B	PUN NO.	663	FREQUENC	Y = 12.87
417E	ewo (xa)	GMC (DY)	GMC (DZ)	GMC (TX)	GMC (TY)	GMC (TZ)	NODE DESCRIPTION
	(OX) .030030000001 .0743 .0094 .0018 .07440038 .0004 .000000000000		(DZ) .0001 .0015 .0098 .00230009 .0013 .00080009 .00410001 .00240002 .0001 .0006 .0000		(TY) .0007 -0001 .0007 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.	0. F. O. F.	
? 2 2 2 2 2 2 3 3 3 3 4 4 4 4 4 4 4 4 4 4	.0000 .0005 .0005 -0001 .0004 .0000 .0000 .0000 .0000 -0000 .0000 .0000 .0000 .0000 .0000 .0000	.0000 .9422 .0348 .0174 .0021 .0029 .0120 .0019 .0000	0003 0101 0003 0008 0006 0142 0008 0000 0000 0000 0000 0000 0000 00	.0188 .0. .0. .0. .0. .0. .0. .0.	0002 0000 0000 0000 000 000 000 000 000	0007 Ci 0018 Ci 0003 Si 0008 Si 0	M, FWD BJLKHEAD M, AFT BJLKHEAD M, FWD BJLKHEAD M, FWD BJLKHEAD M, AFT BJLKHEAD OWER D LATCH, DA OWER -Y TRUNNION OWER -Y SIF, OUTR TM PN 4,5 IF, INNR TM PN 3,1 I
504	• 9000 • 9276	.2459	.0000	.3000 .6278	.0002	•0147	RAZCAN CENTER

TABLE A-45 ORBITAL CONFIGURATION MODAL SURVEY TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 19A

TEST FREQUENCY = 13.30 HZ.

C OMPONE NT	GMC	GMC	GM C	GMC	GM C	GM C
NAME	(DX)	(DY)	(DZ)	(TX)	(TY)	(TZ)
BR/OWS SKIRT/IU/FAS	.0002	.0117	.0065	.6364	.0005	.0029
6-FAS 02 TANKS	.0023	.9110	.0178	û •	0.	0.
MA / ST S / AM	.0006	1268	.0172	•(363	.0359	.6124
5-AM N2 TANKS	.0004	• 4473	.0840	0.	0.	0.
COMMAND/SERVICE MOD.	.0029	. 1507	.0611	.6365	. 1329	.6109
DEPLOYMENT ASSEMBLY	.0010	.0097	.0035	G •	0.	0.
ATH-RACK, CMGS, 4-SAS	.0000	.0001	.0000	.0000	.0000	.0000
ATM-SPAR CENTER	.0000	.0000	.0390	.0364	.0397	0.
ATM-GRA/CAN CENTER	.0000	.0386	.0000	.0305	.0997	.0953
SUM	.0075	• 75 7 3	•1902	.081	.0107	.0262

BR/OWS SKIRT/IU/FAS	.0222
	• 0 2 2 2
6-FAS 02 TANKS	.0311
MDA/STS/AM	•1693
6-AM N2 TANKS	•5316
COMMAND/SERVICE MOD.	•2290
DEPLOYMENT ASSEMBLY	. 9142
ATM-RACK, CMGS, 4-SAS	.0101
ATM-SPAR CENTER	.3011
ATM-GRA/CAN CENTER	.0013

TABLE A-46 SENEPALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

	TEST	HOUE	19 A	RUN NO.	586	FREQUEN	ICY = 13.30
None	GMO	GMC	GMC	GMC	SMC	GMO	CON
NO.	(ÚX)	(DY)	(07)	(TX)	(TY)	(TZ)	
1	• 3 9 9 0	.0049	• 0003	.0000	.3094	0.047	BASE RNG/OWS SKIRT
2	• 0000	• 0045	• 0013	.9801	0001		OWS/IU INTERFACE
7	.0002	0025	.0038		.0002		TU/FAS INTERFACE
4	.0001	.0001	.0008	j.	0.	0.	FAS 02 90TL1,+Y +Z
ū	. 0000	.2015	.0017	0.	0.	3.	FAS 02 BOTL2,+Y +Z
5	.0922	.0020	.0048	9.	0.	0.	FAS 02 BOTL3,-Y +Z
7	0000	.0018	.0013	J •	0.	0.	FAS 02 BOTL4,-Y +Z
8	.0000	.0038	.0010	0.	0.	0.	FAS 02 30TL5,-Y -Z
3	.0000	.0718	.0081	J.	0.	0.	FAS 02 BOTL6,-Y -Z
17	3030	.0000	.0305	3.	3.	0.	FAS/AM/DA IF, +Y
11 12	0000 .0000	.0007 .0009	.0000 0000	0. 0.	0.	0 • 0 •	FAS/AM/DA IF, +Z FAS/AM/DA IF, -Y
1.1 1.3	• 0 3 3 3	0000	.0000	3.	0.	0.	FAS/DA IF, -Y -Z
14	.0000	.0014	• 0000	3.	0	0.	FAS/AM IF, -7
15	• 0 0 0 0	.0002	.0004	0.	0.		FAS/DA IF, +Y -Z
15	.0000	.0003	.0004	.0006			AM TUNNEL/SHEAR WB
1 🕶	.9091	.9971	.0002	.0011	.0013	.0017	AM TUNNEL/STS IF
18	.0001	.0424		. 1029			
19	.0004	.7770	.0123		•0009		
23	• 0 0.0 0	• 4251	.0182	0 •	0.	0.	ME TANK, +Y, LOWER
21	•9993	•0013 •0781	• 0005 0403	3.	0.	0•	NZ TANK, FY, UPPER
22 23	.0001 .0003	.0000	.0102 .0541	ე. ე.	0 • 0 •	0 • 0 •	N2 TANK, +7, LOWER N2 TANK, +Z, UPPER
24	• 6500	.0122	.0003	3.	0.	0.	NE TANK -7, LOWER
25	.0000	.0006	.0005	9.	0.	0.	NE TANK, -Z, UPPER
25	.0001	.0005					CM, FWD BULKHEAD
27	•9002	.1011	.0445	9003	.0010 .3007 .9001	.0057	CM, AFT BULKHEAD
28	.0014	.0991		.0095	.0001		
5.0	.0012	.0399	.0111		.0011	.0024	
3.0	0301	• 0089	.0007	j•	0.	0.	LOWER D LATCH, DA
31 30	7001	0019	.0035 0007	J•	0.	0.	LOWER +Y TRUNNION
32 33	.1008 .0003	.0025 .0002	.0007	0 • 0 •	0.	0 • 3 •	LOWER -Y TRUNNION EREP PACKAGE C.G.
34	.0000	.0000	.0001	3.	0.	0.	ATM PN 6,7 IF, OUTR
72	.0000	.0000	.0000	0.	0.	0.	ATM PN 4,5 IF, OUTR
36	.0000	.0000	.0000	9.	0.	J .	ATM PN 3,1 IF, OUTR
37			.0000	0.			ATM PN 2,3 IF, OUTR
38	. 3000	.0000	.0000	J.	0.	J •	ATM PN 6,7 IF, INNR
₹9	.0000	• 1000	. 0000	0 •	0.	0.	ATM PN 4,5 IF, INNR
4 3	.0000	.0000	.0000	0 •	0 •	0 •	ATM PN 9,1 IF, INNR
41	.0000	.0000	.0000	0.000	0.	0.	ATM PN 2,3 IF, INNR
42 43	.0000 .0000	.0000 .0000	.0000	• 90 00	.3000	.0000	CMG, -Y SIDE
44	•0000	•0000	.0000 .0000	.0000 .0000	.0000 .0000	.0000 .0000	CMG, +Y SIDE CMG, +X SIDE
45	• 9 9 3 9	• 0000	0.).	0.	0.	ATM SAS, PN 1
46	.0000	.0000	0.	9.	0.	0.	ATH SAS, PN 3
47	.0000	.0000	0.	0.	0.	0.	ATM SAS, PN 5
48	0000	0000	0.	9 •	0.	0 •	ATM SAS, PN 7
43	•0000	.0000	.0000	.0004	•0007		SPAR CENTER
د ن	•0003	.0000	•0000	.0005	•0007		GRAZCAN CENTER
504	.0975	.7573	.1902	.0081	.0107		

TABLE A-47 ORBITAL CONFIGURATION MODAL SURVEY TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 20A TEST FREQUENCY = 13.68 HZ. GM C GM C GMC GM C COMPONE NT GMC GMC NAME (DX) (DY) (DZ) (TX) (TY) (TZ) .0007 .0381 .0013 .0001 BRIOWS SKIRT/IU/FAS . 30 87 .0013 6-FAS 02 TANKS .0043 .0145 0. 0. 0. .0137 .0005 .6293 MDA/STS/AM .0010 .0612 . 14 94 .0019 6-AM NZ TANKS .0040 . 3389 . 15 19 C • 0. 0. . 5367 .0008 . 6011 COMMAND/SERVICE MOD. .0019 .0063 •1665 DEPLOYMENT ASSEMBLY .0003 . 33 31 .0312 Ū. û. 0. .0000 ATH-RACK, CMGS, 4-SAS .6000 .0025 .0093 .0021 .0000 ATM-SPAR CENTER .0000 .0196 .0000 .6316 .0065 0. .0012 ATM-GRA/CAN CENTER .0001 .0000 .0001 .[714 .0054 -----------SUM .0148 . 4335 . 4936 .0049 .0475 .0056

BR/OWS SKIRT/IU/FAS	.0202
6-FAS 02 TANKS	.0324
MDA/STS/AM	.2433
6-AM N2 TANKS	• 4649
COMMAND/SERVICE MOD.	.2133
DEPLOYMENT ASSEMBLY	.3046
ATM-RACK, CMGS, 4-SAS	.0050
ATM-SPAR CENTER	.0681
ATM-GRA/CAM CENTER	.0(82

TABLE A-48 GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

	TEST	AUDE	ACS	RUN NO.	627	FREQUENCY	= 13.63
							•
ผาก⊏	SMO	GMC	GMC	GMC	SMC	GMC	NODE
้งา.	(צֹצִיׁי)	เกรา	(07)	(TX)	(TY)	(TZ)	DESCRIPTION
1	.0002	.0027	.0358	.0003	.0001		SE RNG/DWS SKIPT
2 3	• 3 <u>0 9 3</u>	.0°08 .0°14	.0011 .0013	.0005 .0004	030 0 0300		S/IU INTEPFACE
4	.9001	.0014	.0002	• ស្សប្⊶	0.		FAS INTERFACE S 02 BOTL1,+Y +Z
=	.0078	.0015	.0038	9.	0.		5 02 301L2,+Y +Z
5	.3022	.0023	.0012	G •	0.		5 02 90TL3,-Y +Z
~	•8911	.0018	.0048	J.	0.		5 02 90TL4,-Y +Z
8	0000	.0750	0000	0.	0.		5 02 30TL5,-Y -Z
9 10	.0001 0001	.0035 .0005	.0038 0000	១. ១.	G • G •		S 02 30TL6,-Y -Z S/AM/D4 IF, +Y
11	.0002	0000	.0901	0.	0.		S/AM/DA IF, +Z
12	• 0 0 0 0	.9013	.0000	j.	0.		S/AM/DA IF, -Y
13	. 0000	.0002	.0001	3.	0.	9. F	45/74 IF, -Y -Z
14	•0002	.0012	.0331	0.	3.	0 • FA	S/AM IF, -7 AS/DA IF, +Y -Z
15	• 1001	.0001	.0003	J.	0.		
15 17	. 3 0 0 3 . 3 0 0 2	.0010 .0113	.0062 .0013	3000 .3607	.0012 .0038		TUNNEL/SHEAR WA
19	.0303	.0234	.0317	.0004	• J197		AVSTS INTERFACE
19	.0004	0255	.1102	0006	0545		A CONFICYL ITREC
5.3	.0305	. 2538	. 9255	J •	o •	J. N2	TANK, +Y, LOWER
21	.3001	.0361	.0002	9.	0.		TANK, +Y, UPPER
22	•9998	.0049	.0095	0.	0.		TANK, +Z, LOWER
23 24	.0719 .0902	.0001 .0031	.0123 .0907	0. 0.	0. 3.		TANK, +Z, UPPER TANK -Z, LOWER
25	.0002	.0009	.0133	3.	3.		TANK, -7, UPPER
2 ⁻ 5	0901	.0005	0155	. 1001			, FWD BULKHEAD
27	• 4050	.0243	. 1074	.0000			, AFT BULKHEAD
> 8	• 0 7 7 0	.0021	.0955	.0000	.0005		, FWD BULKHEAD
2 G 7 J	. 3 3 3 3 . <i>0</i> 8 3 3	• 1) ^ 9 8 • 10 7 0	.0369 0000	.0007	.0711	-	, AFT BULKHEAD
31	. 9319	0039 7000	.0014	3. 8.	0 • 0 •		WEP D LATCH, DA WEP +Y TRUNNION
72	• 9 9 9 2	0003	0002	0.	0.		WER -Y TRUNNION
77	. 0 3 3 3	.0000	.0000	0.	0.	0 . FR	EP PACKAGE C.G.
34	.0000	.0000	.0007	0.	G •		M PN 6,7 IF,OUTR
रह	.0000	.000	.0003	0.	g .		M PN 4,5 IF, OUTR
36 27	.0000 .0000	• ԴՐԸ Ը • ԴՐԸ Ը	.0001 .0002	ე•	0 • 0 •		M PN 8,1 IF,OUTR M PN 2,3 IF,OUTR
₹ 8	0.004	.0701	.0002	0.	0.		M PN 6,7 IF, INNR
₹0,	.0105	0000	.0001	j.	0.		M PN 4,5 IF, INNR
47	.0008	0001	• 000J	0•	0.		M PN 8,1 IF, INNR
41	.0004	.0002	.0001	0.	0 •		M PN 2,3 IF, INNR
42 43	•9951	.0000	•0000	0000	.0000		MG, -Y SIDE
44	•0731 •0771	.0000	.0000 .0001	.000C	.0000 2000		MG, +Y SIDE MG, +X SIDE
45	.0730	.0000	0.	0.	0.		M SAS, PN 1
4 6	.0000	.0000	0.	0.	ð.		M SAS, PN 3
47	• 0000	.0000	0.	0.	0.	J. AT	M SAS, PN 5
4.8 5.0	.0000	.0000	0.	0.	0.		M SAS, PN 7
49 50	.0000 .0001	.0006 .0000	.0000 .0001	.0010 .0014	•0055 • 0 054		AP DENTER A/CAN CENTER
. 0		0000		* 00 14		#### G*	4 044 DEN 127
PL ?	. 0148	.4335	•4936	.0349	.0475	.0055	

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TABLE A-49 ORBITAL CONFIGURATION MODAL SURVEY

TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 21A

SUM

COMPONENT GMC GMC GM C GMC GM C GM C NAME (DX) (Y ()) (DZ) (TX) (TY) (TZ) 9R/OWS SKIRT/IU/FAS .0801 .0000 .0123 .0332 1 .0005 6-FAS 02 TANKS .0025 .0058 .0078 0. J . 0. .0216 MDA/STS/AM .0000 .1102 . 04 0 0 .0341 .0160 5-AM NZ TANKS .5918 .0023 ∂. 3. .031C û. COMMAND/ SERVICE MOD. .0027 .[356 .0013 -1158 .021F .0374 DEPLOYMENT ASSEMBLY .0001 -. 3001 . 3345 Û. O. 0. 3003. ATM-RACK, CMGS, 4-SAS .0002 .0301 .0003 . (000 .0000 ATM-SPAR CENTER .0000 . 00 00 .0000 3000. .0003 .0001 ATM-GRA/CAN CENTER .0000 .0001 . 4361 .0304 .0000 ----

TEST FREQUENCY = 14.55 HZ.

.0273

.0061

.0239

TOTAL GM CONTRIBUTION FOR EACH COMPONENT

. 8269

.1780

.0079

BR/OWS SKIRT/IU/FAS	.0063
6-FAS 02 TANKS	•0161
MDA/STS/AM	.1919
6-AM N2 TAMKS	•6251
COMMAND/SERVICE MOD.	1547
DEPLOYMENT ASSEMBLY	-0(44
ATM-RACK, CMGS, 4-SAS	.0176
ATH-SPAR CENTER	.0093
ATM-GRAZCAM CENTER	-8607

TABLE A-50 GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

TEST MODE 21A RUN NO. 633 FREQUENCY = 14.55

		•		(5 (110 (2 70 2	
W005	CHO		640	2112	5	•	
40DE	940 (9X)	GMC (DY)	GMC (DZ)	GMC (TX)	GMC (TY)	GMC (TZ)	
, · · · · ·	(54)	(01)	(1)2.7	(1,7)	((()	(12)	DESCRIPTION
1	.0000	.0704	.0023	3003	• 2000	.0002	BASE RNG/DWS SKIRT
2	• 8 7 8 2	•0004	.0001	.0000	0000	0000	OWS/IU INTERFACE
3	• 0 0 0 0	.0008	.0007	.0000	.0001	.0003	TU/FAS INTERFACE
4 5	•3002	•0014	.0005	0 •	0.	0 •	FAS 02 BOTL1,+Y +Z
, F	.0939 .0937	.0002 .0014	.0018 .0015	0. 3.	0. 0.	J .	FAS 02 BOTL 2, +Y +Z
7	.9912	.0001	.0017	0.	3.	0. 0.	FAS 02 BOTL3,-Y +Z FAS 02 BOTL4,-Y +Z
.8	.0002	.0025	.0304	0.	3.	0.	FAS 02 BOTL5,-Y -Z
q	• 3333		.0025	0.	0.	0.	FAS 02 30TL6,-Y -Z
11	0133	•09 C O	0000	0.	0.	0.	FAS/A4/NA IF, +Y
11	• 9 9 9 9	. 2004	• 0000	0 •	0 •	0.	FAS/AM/DA IF, +Z
12	0 000	.0001	6001	0 •	0 •	0 •	FAS/AM/DA IF, -Y
13 14	7990 -9990	.0701	.0001	3.	0.		FAS/DA IF, -Y -Z
17	• 0 0 0 0	.0001 2900	.0000 .0000	9. 9.	0. 3.	0. 0.	FAS/AM IF, -Z FAS/DA IF, +Y -Z
15	• 0 10 0	.1900	.0001	.0032	.0301		FAS/DA IF, +Y -Z AM TUNNEL/SHEAR WB
17	.0000	0916	.0013	.0090	.0005	.0026	
1.8	. 9 2 0 0	.0254	.0153	.0054	.0030	.0127	MDA/STS INTERFACE
13	.0000	■U832	• 0237	.0039	.0004	.0005	MDA CONE/CYL ITREC
50	• 0 0 0 3	.0015	0035	0 •	0 •	0.	N2 TANK, +Y, LOWER
21	• ŋ n 1 6	• 5264	.0019	0.	0.	0.	N2 TANK, +Y, UPPER
22 23	.0001 .0001	•0583 •0907	.0000 .0231	0. 0.	0 •	0.	N2 TANK, +Z, LOWER
24	.0001	•0030	.0018	0.	0 • 0 •	3. 0.	N2 TANK, +Z, UPPER N2 TANK -7, LOWER
25	.0001	.0520	.0005	0.	0.	0.	NO TANK -7, LOWER
25	.0061	.0068	.0022	.0005	.0005		CM, FWO BULKHEAD
27	0900	. 11797	.0114	•0009	.0005		CM, AFT BULKHEAD
28	• 3714	.0050	.0022	.0013	.0001	.0005	
29	.0012	.0253	•0052	• 0029	•0000	.0006	
39 31	.0000 0001	0003	0000	0.	0.	0.	LOWER D LATCH, DA
32	• 9991	.0001 .0001	.0007 .0037	0. 0.	0 • 0 •	0 • 0 •	LOWER +Y TRUNNION LOWER -Y TRUNNION
₹ ₹	.0333	.0001	.0000	0.	0.	0.	EPEP PACKAGE C.G.
34	• 0000	.0000	0000	0.	0.	0.	ATM PN 6,7 IF, OUTR
35	3000	.0000	.0000	0.	0.	3.	ATM PN 4,5 TF, OUTR
36	0000	.0000	.0002	0.	0.	0.	ATM PN 8,1 IF, OUTR
37	.0300	.0000	.0000	3 •	9.	0.	ATM PN 2,3 IF, OUTR
30	• 3000	.0000	0000	0.	0.	9.	ATM PN 6,7 IF, INNR
્રવ હાૃ	•0703 •0701	.0000 0000	0000 .0000	0. 0.	0.	9.	ATM PN 4,5 IF, INNE
41	• 0 0 0 0	.0000	•0000	0.	0.	0 • 0 •	ATM PN 8,1 IF, INNR ATM PN 2,3 IF, INNR
42	. 0000	.0000	0000	.0000	.0000	.0000	CMG, -Y SIDE
43	.0000	.0000	.0000	.0000	.0000	.0000	CMG, +Y SIDE
44	.0030	.0000	.0000	0000	.0000		CMG, +X SIDE
45	0000	0000	0.	0 •	0 •	0.	ATM SAS, PN 1
46	-0000	•0700	0.	0.	0.	0.	ATM SAS, PN 3
4.7 4.8	•0000 •0000	.0000	0.	0.	0.	0.	ATM SAS, PN 5
49	• 0 0 0 0	.0000	0. .0000	0. .0000	0. .0003	0.000	ATM SAS, PN 7 SPAR CENTER
F ŋ	• 0000	.0001	.0001	.0001	.0003		GRAZCAN CENTER
SIM	. 1179	.8263	.1080	.9273	.0051	• 0239	1

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TABLE A-51 ORBITAL CONFIGURATION MODAL SURVEY TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 228

TEST FREQUENCY = 15.40 HZ.

COMPONENT	GMC	GM C	GM C	GMC	GM C	GM C
NAME	(DX)	(DY)	(DZ)	(TX)	(TY)	(YZ)
BR/OWS SKIRT/IU/FAS	.0010	.0108	.0119	.0051	.6029	.0048
6-FAS 02 TANKS	. 1326	• 05 9 3	. 1686	0.	0 •	0.
HDA/STS/AM	.0002	.1203	.0154	.0750	.0051	.0295
6-AM N2 TANKS	.0002	.1360	. 10 81	0.	c •	0.
COMMAND/SERVICE MOD.	.0023	.1155	.0236	.0198	.0007	.0102
DEPLOYMENT ASSEMBLY	.0138	.0260	.0048	6.	0.	3 •
ATM-RACK, CMGS, 4-SAS	.0012	.8991	.0002	.0086	.0000	.0000
ATH-SPAR CENTER	.0000	.0000	0000	.021	.0000	0 •
ATM-GRAZCAN CENTER	.0001	.0381	.0000	.6728	. 20 30	.6000
SUM	• 150 3	• 4681	• 23 27	.0957	.0388	.0445

BR/OWS SKIRT/IU/FAS	.9364
6-FAS 02 TANKS	.2606
MDA/STS/AM	• 2455
6-AM N2 TANKS	• 2443
COMMAND/SERVICE MOD.	•1630
DEPLOYMENT ASSEMBLY	.0446
ATM-RACK, CMGS, 4-SAS	.0004
ATM-SPAR CENTER	.0021
ATM-GRAZCAN CENTER	.0030

TABLE A-52 GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

•	TEST	AUJE	22 B	RUN NO.	654	FREQUEN	ICY = 15.4)
インリニ	540	GMC	GMC	GMC	SMC	GMC	
۸U.	(XD)	(DY)	(07)	(TX)	(TY)	(TZ)	DESCRIPTION
		0004	0074	0010	2245		0105 346 4040 0455
1 2	.0000 0000	.0001 .0024	.0031 .0028	.0048 .0001	.0016 .0008	• 9 8 3 9	BASE RNG/DWS SKIRT
- 	.3004	.0018	.0025	.0001	.0005	0000	OWS/IU INTERFACE IU/FAS INTERFACE
ù	.0099	.0138	.0075	0.	0.0007	0.000	FAS 02 30TL1,+Y +Z
=	.0406	.0182	.0150	0.	0.	0.	FAS 02 BOTL2,+Y +Z
5	•0228	.0009	0000	9.	0.	3.	FAS 02 BOTL 3, -Y +Z
÷	.0024	0000	.0021	0.	0.	0.	FAS 02 BOTL4,-Y +Z
9	.0425	.0180	.0156	1.	0.	0.	FAS 02 BOTL5,-Y -Z
Q	.0363	.0184	.0274	3.	0.	0.	FAS 02 BOTLS, -Y -Z
10	.0002	.0004	0000	3.	3.	0.	FAS/AM/DA IF, +Y
11	.0992	.0012	.0015	0.	0.	0.	FAS/AM/DA IF, +Z
12	.0091	.0027	.0017	J •	0 •	0.	FAS/AM/DA IF, -Y
13	0000	.0016	0013	0.	0.		FAS/DA IF, -Y -Z
14	.0011	.0006	.0001	J.	0 •	3 •	FAS/AY TF, -7
15	• 9 9 9 9	•0000	• 0000	0 •	0.	0.	FAS/DA IF, +Y -Z
Ą۶	•000	.0062	.0021				AM TUNNEL/SHEAR WB
17	.0200	•0045			.0012		AM TUNNEL/STS IF
18	.0001	.0093	.0000		.0021		
1 0	. 0 7 0 7	.1003	.0068	• J162	.0017	.0314	
20	.0000	.0047	.0172	0.	0.	J.	N2 TANK, +Y, LOWER
21 22	.0001 .0000	.0330 .0417	.0110 .0005	3. 3.	0 • 0 •).).	N2 TANK, +Y, JPPER
5 <u>3</u> .	• 0 7 0 9	.0302	.0183	0.	0.	J.	N2 TANK, +Z, LOWER N2 TANK, +Z, UPPER
24	.3031	.0261	.0366	J•	0.	3.	N2 TANK -7, LOWER
25	.0000	.0002	.0249	3.	n.	Λ.	NO TAME7. HODED
26	. 0 0 0 0	.0250			.0034	.0038	CM, FAD BULKHEAD CM, AFT BULKHEAD
27	0000	.0672	.0175	. 3244	.0002	.0057	CM, AFT BULKHEAD
28	.0918	.0012	.0001	.0002	0000	.0004	SM, FWD BULKHEAD
29	.0005	.0211	.0013	.0941	.0031	.0003	
ਤ ਹੁ	. 0004	.0301	.0000	ŋ •	0.	0.	LOWER D LATCH, DA
71	.3100	0006	.0063	0 •	0.	0.	LOWER +Y TRUNNION
3.5	•0031	0038	0014	J •	0.	0 •	LOWER -Y TRUNNION
7.7	.0003	.0002	• 0002	0.	0 •	0.	EREP PACKAGE C.G.
34	.0000	.0000	.0001	0.	0.	0.	ATM PN 6,7 IF, OUTR
₹F.	0000	.0000	.0000	0.	0.	0.	ATM PN 4,5 IF, OUTP
7.A	.0000	.0000	.0390	0.	3.	0.	ATM PN 8,1 IF, OUTR
77	.3303		.0000	_	0.	J.	ATM PN 2,3 IF, OUTR
₹ 8	.0101	.0000	.0000	0.	0.	9.	ATM PN 6,7 IF, INNR
۴ Ú 2 ن	. 9 0 9 9 . 9 9 9 9	• ๆ • 0 0	.0000	0.	0.	0.	ATM PN 4,5 IF, INNR
41	• 0 0 0 0	.0000 .0000	.0000 .0000	0 • 0 •	0.). 0.	ATM PN 8,1 IF, INNR ATM PN 2,3 IF, INNR
42	• 0000	.0000	.0000	.0000	.0000	.0000	CMG, -Y SIDE
43	.0000	.0000	.0000	3000	.0000	.0000	CMG, +Y SIDE
44	•0000	• 0000	.0000	0000	•0000	.0000	CMG, +X SICT
4 5	0000	0000	0.	J.	0.	0.	ATM SAS, PN 1
45	.0000	.000	0.	0.	0.	j.	ATM SAS, PN 3
47	.0000	.0000	0.	0.	0.	0.	ATM SAS, PN 5
4 A	.0000	.0000	0.	0.	0.	0 •	ATM SAS, PN 7
49	. 0000	.0000	0000	.0021	•0000	.0000	SPAR DENTER
₹ O	.0001	.0001	• 0000	.0028	•0000	.0000	GRAZCAN CENTER
_							
ςυм	1503	•4681	• 2327	.0957	•0388	. 0445	5

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TABLE A-53 ORBITAL CONFIGURATION MODAL SURVEY TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 22A TEST FREQUENCY = 15.78 HZ.

COMPONENT	GMC	GM C	GH C	GMC	GM C	GMC
NAME	(DX)	(DY)	(DZ)	(TX)	(TY)	·(TZ)
BR/OWS SKIRT/IU/FAS	.0030	.0111	.7166	.[712	.C100	.0354
6-FAS 02 TANKS	• 230 9	• 0753	• 04 49	0 •	0 •	0 •
MDA/STS/AM	.0030	.1061	• 05 92	.6100	.0225	.0165
6-AM N2 TANKS	.0011	• ü17¢	.0747	0.	0.	0.
COMMAND/SERVICE MOD.	.0113	. 15 45	• 03 40	.0225	• LØ 56	.0158
DEPLOYMENT ASSEMBLY	.0192	. 2183	.0015	₽•	0.	8 •
ATM-RACK, CMGS, 4-SAS	.0013	.0022	.0011	.0000	.0300	.0000
ATM-SPAR CENTER	.0002	.0000	• 00 00	.0006	.0007	0.
ATM-GRAZCAN CENTER	.0003	. 1002	.0301	.0008	.0007	.0002
SUM	. 2703	• 3849	• 23 22	.6352	.0395	•6379

BR/OWS SKIRT/IU/FAS	.0474
6-FAS 02 TANKS	• 35 1 1
MDA/STS/AM	• 2173
6-AM N2 TANKS	• 3928
COMMAND/SERVICE MOD.	.2437
DEPLOYMENT ASSEMBLY	• 3390
ATM-RACK, CMGS, 4-SAS	.0047
ATM-SPAR CENTER	.0015
ATM-GRA/CAN CENTER	.0023

TABLE A-54 SENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

TEST MODE 22A RUN NO. 506 FREQUENCY = 15.78

พอกร	GMC	GMC	GMC	GMC	SMC	GMC	NODE
นา.	(XG)	(PY)	(07)		(TY)	(TZ)	
1	. 3003	• <u>0</u> ∩ <u>0</u> 8	• 0 0 3 5	.0012	.0058		BASE RNG/DWS SKIPT
2 3	0001	.0038 .0034	.0335 .0322	.3000 3000	.0021 .0112		OWS/IU INTERFACE TU/FAS INTERFACE
4	.0019 .0085	• 9134	.0052	3.	0112		FAS 02 BOTL1,+Y +Z
7	.0931	.0055	• 017F	J.	0.		FAS 02 30TL2,+Y +Z
5	0001	.0006	.0019	i.	0.		FAS 02 301L3,-Y +Z
7	.0145	0000	.0081	j.	0.		FAS 02 30114,-Y +Z
Я	.9738	.0379	.0121	J.	0.		FAS 02 BOTLE, -Y -Z
3	• 9°38	.0139	.0001	0 •	0.	0.	FAS 02 30[L5,-Y -Z
13	.0003	0901	.0005	3.	0.	0.	FAS/AM/DA IF, +Y
11	.0993	.0029	.0019	J.	g •		FAS/AM/DA IF, +7
1? 13	.9091 .0009	.0007 0513	.0042 .0005	0 • 0 •	0. 0.		FAS/A4/DA IF, -Y -Z
14	•0001	.0910	• 00 01	J.	0.		
15	.0000	0000	.0001	j.	0.	0.	FAS/AM IF, -7 FAS/DA IF, +Y -Z
1 =	.0002	.0062		.0014			AM TUNNEL/SHEAR WB
17	• 0004	.0:32	.0042	.0045	.0042	.0030	AM THNNEL/STS IF
18	•0012	.9235	.0003	.0021	• 3129	•0132	MDA/STS INTERFACE
19	.0012	• DP 22	.0515	• 0021	.0355	.0002	MOA CONEVOYL ITREC
21 21	•0006	.0000	.0115	0.	8 •) •	MS TANK, TY, LOWER
?1 ?2	.0001 .0001	.0000 .0076	.0079 .0014	0.	0 •	0.	N2 TANK, +Y, UPPEP N2 TANK, +Z, LOWER
23	.0000	.0782	.0105	0.	0.	0.	N2 TANK, +7, UPPER
24	.0000	.0110	.0193	G.	0.	3.	N2 TANK -7, LOWER
25	.0002	.0001	.0240	3.	G.	0.	NZ TANK, -7, UPPER
25	.0945	.9061	.0001		.0012		CM, FWO BULKHEAD
27	0000	• 1962		•0080	0030	•0052	OM, AFT BULKHEAD
28	. 3 049	.0148	.0004	.0002	.0005	.0013	SM, FWD BJLKHEAD
20	.0020	.0374	.0333	.0061	•0039		SM, AFT BULKHEAD
30 31	• 7021 • 3137	.0231 .0003	.0019 0004	0 •	0.	0.	LOWER D LATCH, DA LOWER HY TRUNNION
3.0	.0014	0051	0004	9.	0.	0.	LOWER -Y TRUNNION
दर	0020	.0000	0003	0.	3.	0.	EPEP PACKAGE C.G.
34	.0001	0000	.0001	0.	0.	0.	ATM PN 5,7 TF, OUTR
35	.0004	0000	.0001	0.	0.	0 •	ATM PN 4,5 IF, OUTR
36	• 9 9 9 9	.0000	.0003	9.	0.	0.	ATM PV 8,1 IF, OUTR
77	.0003	.0002	.0000	J.	0.	9 •	ATM PN 2,3 TF, OUTR
₹8 ₹9	0000	.0012 .0503	.0000 .0001	0 •	0 • 0 •	0 •	ATM PN 5,7 IF, INNR
.0	.0004 0000	.0001	.0002	Դ. Տ.	0.	0 • G •	ATM PN 4,5 IF, INNR ATM PN 8,1 IF, INNR
41	0000	.0001	.0000	0.	9.	0.	ATM PN 2,3 TF, INNR
レラ	.0301	.0001	.0000	.0000	0000	.0000	CMG, -Y SIDE
43	.0000	.0001	.0001	.0000	•0000	.0000	CMG, +Y SIDE
44	•0000	.0000	.0000	.0000	.0000	.0000	CMG, +X SIDE
45	.0000	.0000	0.	0.	D •	0.	ATM SAS, PN 1
45	.0000	•0000	0.	0 •	0.	0.	ATM SAS, PN 3
47 48	3000	0000 .0000	8• n	0.	0 • 0 •	0 •	ATM SAS, PN 5
4 G	.0000 .0002	.0000	• 0000	0. .0006	.0007	0. .0002	ATM SAS, PN 7 SPAP CENTER
70	.0002	.0002	.0001	.0008	.0007		GRAZCAN CENTER
SJM	.2703	.3849	• 2 3 2 2	.0352	.0395	.0381	L

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TABLE A-55 ORBITAL CONFIGURATION MODAL SURVEY TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 23A TEST FREQUENCY = 16.20 HZ.

C OMPONE NT	GM C	GM C	GM C	GMC	GMC	GMC
NAME	(DX)	(PY)	(DZ)	(TX)	(TY)	(TZ)
BR/OWS SKIRT/IU/FAS	.0042	• 0390	.0348	.6378	. 6127	.0018
5-FAS 02 TANKS	. 1797	• G5 32	• 9872	0.	9.	9 •
MDA/STS/AM	.0009	.0023	•J858	.0342	.0386	.0004
6-AM N2 TANKS	.0031	.0126	·2980	0.	0.	0.
COMMAND/SERVICE MOD.	.0019	• 93 35	•1123	.0091	.0041	.0002
DEPLOYMENT ASSEMBLY	.0108	• 6073	.0008	0.	9.	0 •
ATM-RACK, CMGS, 4-SAS	.0027	.0040	.0036	1002.	.0338	.0000
ATH-SPAR CENTER	.0002	· 60 J2	.0001	.0313	.012	0.
ATM-GRA/CAN CENTER	.0001	.0313	.0000	.0015	.3024	.0040
SUM	• 19 46	• 0932	.6228	.0239	.0591	.0065

BR/OWS SKIRT/IU/FAS	.3702
6-FAS 02 TANKS	.3111
MDA/STS/AM	•1323
6-AM N2 TANKS	.3137
COMMAND/SERVICE MOD.	.1312
DEPLOYMENT ASSEMBLY	.8189
ATM-RACK, CMGS, 4-SAS	.8193
ATM-SPAR CENTER	.0030
ATM-GRA/CAN CENTER	.0093

TABLE A-56 STREPALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

TEST MODE 23A RUN NO. 645 FREQUENCY = 16.23

		1.7.12	(.JA	104 1104	1747	1 10 12 140 121	10121
MUUL	GMC	GMC		GMC	SMC		
٠ (۲ الا	(nx)	(DY)	(DZ)	(TX)	(TY)	(TZ)	DESCRIPTION
		_					
1	.0021	•0016	.0018	.0004	.0087 .0027	.0015	BASE RNG/DWS SKIRT
? 3	0001	.0001	• 0036	.0026	.0027 .0013	• 0 7 0 1	OWS/IJ INTERFACE
4	•0913 •9087	0001 .0034	.0312 .0033	. 3048 3.	• UU13	9.	IU/FAS INTERFACE FAS 02 30TL1,+Y +Z
=	• 0 ° 0 ° 2	.0076	.0133	9.	0.	0.	FAS 02 BOTL2,+Y +Z
5	9433	0051	.0162	3.	0.	9.	FAS 02 BOTL3,-Y +Z
-	်ပိုင်းထိုပြ	0252	.0121	9.	0.	0.	FAS 02 30TL4,-Y +Z
P	.0553	.0123	.0254	S •	0.	0.	FAS 02 30TL5,-Y -Z
3	0 712	0003	.0172	J •	0.	0.	FAS 02 90TL6,-Y -Z
10	.0001	.0010	.0037	3 .	Ů•	0.	FAS/AY/DA IF, +Y
11	.0011	.0021	.0056	J •	0.	0 •	FAS/AM/DA IF, +Z
12	• 7 n g 7	.9001	.0064	G •	0.	J •	FAS/AM/DA TF, -Y
13	0001	.0830	.0068	J.	J •		FAS/DA IF, -Y -Z
14	.9911	. ᲛᲝᲛᲛ . ᲛᲝᲛ4	.0344	g.	0.	0.	FAS/AM IF, -7
15	.0000 .0001	• 0000 • 0000	.0002 .0102	0005	0. 0000	0.	FASIDA IF, +Y -Z AM TUNNELISHEAR WR
17	.0001	.0006	.0253			.0001	
1 p	.0003	9301			·C191	.0003	MDAZSTS INTERFACE
13	.0003	.0017	.0536	.0017	.0130	0000	
56	. 2215	.0001	.0500	0.	0 •	0.	N2 TANK, +Y, LOWER
21	• 9 0 9 0	.0921	.0304	0 •	0.	0.	N2 TANK, +Y, UPPER
22	.0002	.0000	.0085	0 •	0.	0 •	Nº TANK, +Z, LOWER
23	.0005	.0910	.0369	0.	0 •	0.	N2 TANK, +Z, UPPER
24	.0007	. 0n49	.1248	ą.	0.	0.	N2 TANK -7, LOWER
25 25	•0000	.0044	.0475	0.	0.	0.	NZ TANK, -7, UPPER
2 h 2 7	0102 .0115	.0501 .0514	.0324 .0307	.0081	•0022 •0004	0000	CM, EWD BULKHEAD CM, AFT BULKHEAD
28	.0001	.0005	.0033		.0003	0007	SM, FWD BJLKHEAD
20	• 9003	.9015	.0460	0002	.0013	.0000	SM, AFT BULKHEAD
ΖŊ	.0003	. 1096	.0001	3.	J.	0.	LOWER D LATCH, DA
31	0002	0024	.0005	S .	0.	0 •	LOWER +Y TRUNNION
2 ک	• 0 0 9 5	0004	.0000	0 •	0 •	0 •	LOWER -Y TRUNNION
33	.0021	•0004	.0000	ŭ •	0.	0.	EREP PACKAGE C.G.
74	.0002	.0003	.0009	Ū•	0.	0.	ATM PN 6,7 IF, OUTR
75 76	.0004	.0001	.0907	0.	0 •	0 •	ATM PN 4,5 TF, OUTR
37	.0011 .0010	.0081 0000	.0005 .0002	0•	0.	0. 0.	ATM PN 3,1 TF, OUTR ATM PN 2,3 TF, OUTR
- 7-A	.0000	.0010	.0002	0.	0.	0.	ATM PN 5,7 IF, INNR
3.7	7901	.0003	.0093	3.	0.	0.	ATM PN 4,5 IF, INNR
Lŋ	2001	• 9904	.0002	9.	0.	0.	ATM PN 3,1 IF, INNR
41	. 3000	.0009	.0001	0.	0 •	0.	ATM PN 2,3 IF, INNR
42	0000	.0092	.0001	. 9000	.0006	.0000	CMG, -Y SINE
43	•9990	.0002	.0000	.0000	.0000	.0000	CMG, +Y SIDE
44	•0000	.0002	.0001	.0000	•0000	•8000	CMG, +X SIDE
45	.0001	.0001	0.	0.	0.	0.	ATM SAS, PN 1
45 47	.0000	.0000	0 •	0.	0.	0.	ATM SAS, PN 3 ATM SAS, PN 5
4 P	•0000 •0000	.0000 .0000	0• 0•	0. 9.	0.	0 • 0 •	ATM SAS, PN 5 ATM SAS, PN 7
4.3	.0002	.0002	.6001	.0013	.0012		SPAR CENTER
F 6	.0001	.0013	.0000	.0015	.0024		GRAZCAN CENTER
-							
SUM	.1945	•1932	·5228	.0239	•0591	• 0066	5

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TABLE A-57 ORBITAL CONFIGURATION MODAL SURVEY

TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST FREQUENCY = 16.53 HZ. TEST MODE NO. 24A COMPONENT GHC GMC GM C GM C GM C GMC NAME (XQ) (DY) (DZ) (TX) (TY) (TZ) .0461 . 32 45 .0013 3R/OWS SKIRT/IU/FAS .0021 .[377 -.3012 6-FAS 02 TANKS 0. ŋ. . 2163 .3512 . 3280 ų. .0757 .0006 .0005 .0090 MDA/STS/AM .00 25 .0015 6-AM N2 TANKS . 3252 C. .0028 .0008 0. 3. .0010 .0007 .0010 COMMAND/SERVICE MOD. . 0110 .0012 .5001 0. DEPLOYMENT ASSEMBLY .0394 . 3556 . 2048 0. ø. .0234 .0001 ATH-RACK, CMGS, 4-SAS .0177 .0000 .0001 .0172 ATM-SPAR CENTER .0003 .0002 .0301 .013 .0112 0. .001C .6303 .0052 ATH-GRAZCAN CENTER .0037 .001F .(104 ----.0792 SUM . 2824 .5888 .(119 .0210 .3166

BR/OWS SKIRT/IU/FAS	.0806
6-FAS 02 TANKS	-2954
MDA/STS/AM	.0898
6-AM N2 TANKS	• 3288
COMMAND/SERVICE MOD.	.0149
DEPLOYMENT ASSEMBLY	.0998
ATM-RACK, CMGS, 4-SAS	• 0585
ATM-SPAR CENTER	.0130
ATM-GRA/CAN CENTER	.0193

TABLE A-58 GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

	TEST	L AUDE	24 A	RUN NO.	638	FREQUENCY = 16.53
۷)n <u>-</u>	GMC (DX)	GMC (DY)		GMC (TX)	GMC (TY)	GMC NODE (TZ) DESCRIPTION
1 7 5 7 8 9 10 11 12	.0005 .0001 .0009 .0208 .0120 .0056 .0170 .0017 .1591 .0004 .0002	.0001 .0110 .0119 .0005 .0010 .0238 .0075 .0183 .0201 .0015 .0006		.0006 .0043 .0035 0. 0. 0.	.1302 0013 0. 0. 0. 0. 0.	.0002 OWS/IJ INTERFACE .0001 IU/FAS INTERFACE 0. FAS 02 BOTL1,+Y +Z 0. FAS 02 BOTL2,+Y +Z 0. FAS 02 BOTL3,-Y +Z 0. FAS 02 BOTL4,-Y +Z 0. FAS 02 BOTL4,-Y +Z 0. FAS 02 BOTL5,-Y -Z 0. FAS 02 BOTL6,-Y -Z 0. FAS/AY/DA IF, +Y 1. FAS/AY/DA IF, +Z
13 14 15 15 17 18 19 20 21 22 23	7000 0001 .0003 .0003 .0002 .0009 .0009 .0001 .0005	.0174 .0018 .0001 .0361 .0270 .0388 .0739 .0288 .0737 .0155	.007400040001 .0000 .0000 .0002 .0013 .0005 .0000 .0001	.0001 .0005 0000	.0001 .0003 .0001	0. N2 TANK, +Y, LOWER N2 TANK, +Y, LOWER N2 TANK, +Y, UPPER N2 TANK, +Z, LOWER N2 TANK, +Z, UPPER
24567 899 123 345 67 37 38 38 38 38 38 38 38 38 38 38 38 38 38	.0000 .0000 .0000 .0000 .0005 .0005 .0173 .0138 .0013 .00141	0001 .0001 .0007	.0001 .0009 .0000 .0000 .0001 .0009 .0051 0012 0000 .0021 .0048 .0049	. 26 03 . 00 00 . 00 01 3. 0. 0. 0.	-0000 -0000 0.0000	0. NZ TANK -Z, LOHER 0. NZ TANK, -Z, UPPER .0003 CM. FAD BULKHEAD
39991234567890 M	.0002 .0030 .0002 .0002 .0008 .0002 .0000 .0000 .0000 .0001 .0000 .0001 .0003 .0003 .0003	.0121 .0031 .0003 .0018 .0009 .0007 .0002 .0001 .0000 .0001 .0002 .0002 .0003	.0007 .0017 .002? .0001 .0009 .0008 .0002 0. 0. 0. 0. 0. 0. 0.001 .0007	0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0	0. 0. 0. .0000	0. ATM PN 6,7 IF, INNR 0. ATM PN 4,5 IF, INNR 0. ATM PN 8,1 IF, INNR 0. ATM PN 2,3 IF, INNR 0. ATM PN 2,3 IF, INNR 0. CMG, -Y SIDE 0.0000 CMG, 4Y SIDE 0. ATM SAS, PN 1 0. ATM SAS, PN 3 0. ATM SAS, PN 5 0. ATM SAS, PN 5 0. ATM SAS, PN 7 0.0003 SPAP CENTER

TABLE A-59 ORBITAL CONFIGURATION MODAL SURVEY TEST MODES GENERALIZED MASS CONTRIBUTION SUMMARY

TEST MODE NO. 25A TEST FREQUENCY = 17.01 HZ. COMPONE NT GM C GMC GM C GM C GM C GMC NAME (DX) (DY) (DZ)(TX) (TY) (TZ) .6926 -.0005 BR/OWS SKIRT/IU/FAS .0171 .0307 .0411 .0044 . 3227 .0292 6-FAS 02 TANKS . 2948 0. 0. 0. .0000 MDA/STS/AM . 3382 .0072 .0037 -.0003 .0005 C. 5-AM N2 TANKS · 0768 .0154 .0178 C. 0. COMMAND/SERVICE MOD. .0994 .6196 .0034 . 09 37 .3078 .0019 DEPLOYMENT ASSEMBLY .0938 . 20 24 .0009 0. 0. 0. . C0 11 .3034 .0005 3600. .0000 ATM-RACK, CMGS, 4-SAS .0000 ATM-SPAR CENTER .0061 . 30 01 . 0001 .0302 .0009 0. . 90 00 .0303 ATH-GRAZCAN CENTER 00003. .0002 .0308 . 5004 -------------------. 8257 · 0568 .0952 .0332 . 0044 SUM .0148

BR/OWS SKIRT/IU/FAS	.0648
6-FAS 02 TANKS	• 3467
MDA/STS/AM	•3493
6-AM N2 TANKS	.1101
COMMAND/SERVICE MOD.	•1169
DEPLOYMENT ASSEMBLY	.0071
ATM-RACK, CMGS, 4-SAS	.0(19
ATM-SPAR CENTER	.0013
ATM-GRA/CAN CENTER	.0018

TABLE A-60 GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDON

	TFST	AUDE	25 A	RUN NO.	499	FREQUEN	CY = 17.01
400 •	946 (30)	GMC (ny)	GMC (DZ)	GMC (TX)	GMC (TY)	GMC (TZ)	
1	.0375	.0000	.0173	.0015	0001	.0000	BASE RNG/DWS SKIRT
2	• 0028	.0031	.0051	.0002	0002	.0000	OWS/IU INTERFACE
3	•0963	.0084	.0113	.0003	0002	.0044	TU/FAS INTERFACE
4	.1430	•0122	.0082	O .	0.		FAS 02 90TL1,+Y +Z
5	• 0532	.0º35	.0080	0.	0.	9.	FAS 02 30TL2,+Y +Z
5	.0113	.0012	.0007	0 •	0.	0 •	FAS 02 BOTL3,-Y +Z
7	.0429	•0003	.0021	0.	0.		FAS 02 BOTL4,-Y +Z
ዓ	.0455	.0141	.0078	3 ·	0.		FAS 02 BOTL5,-Y -Z
9	0910	.0614	.0024	0.	J •	Ð •	FAS 02 BOTL5,-Y -Z
17	.0003	0002	• 00 0 3	0 •	0 •	0.	FAS/AM/DA IF, +Y
11	7902	•0000	.0043	0.	0.	0.	FAS/AM/DA IF, +Z
12	.0000	•0006	0000	3.	0.	9.	FAS/AM/DA IF, -Y
13		0005	.0012	0.	0.		FAS/DA IF, -Y -Z
14	• 0 0 0 3	.0001	.0010	0.	0 •		FAS/AM IF, -Z
1 =	.0002	•0001	.9001	ე•	0.	0 •	FAS/DA IF, +Y -Z
15	.0319	.0033	.0009	0000	.0901	.0002	AM TUNNEL/SHEAR WB
17	.0714	.0015	• 001 ⁷	0000 -0000	.0002	• 0 C 0 4	AM TUNNEL/STS IF
18		0001					MDA/STS INTERFACE
1 ^	.1002	.0224		• 9000	00032		MOA CONE/CYL ITREC
50	.0185	.0003	.0051	0.	9.		N2 TANK, +Y, LOWER
21	.0073	.0010	.0020	0.	0 •		N2 TANK, +Y, UPPER
22	• ŋŋ٩9	.0001	.0012	0.	8 •		N2 TANK, +Z, LOWER
23	.0151	.0056	.0065	0.	0 •		N2 TANK, +Z, UPPER
24	0 145	.0004	.0017	0.	0.		N2 TANK -Z, LOWER
25	.0116	.0081	.0012	ŋ.	0.		N2 TANK, -Z, UPPER
26	• 1972	.0025					CM, FWD BULKHEAD
?7		0000	.0000	.0001 .0004	.0015	.0007	CM, AFT BULKHEAD
2.8	.0193	. OC 44		.0004	• 0000	.0047	SM, FWD BULKHEAD
23	• ⁶	8000	.0018	.9001	.0003		SM, AFT BULKHEAD
30	.0532	.0006	0002	0.	0.		LOWER D LATCH, DA
31 32	•0003	.0005 .0013	0001	0.	0.		LOWER +Y TRUNNION
3.7 3.3	•9001 • 0 302	.0000	•0012 •0000	0 •	0.		LOWER -Y TRUNNION EREP PACKAGE C.G.
34	•0302 •0301	.0000	• 00 00	0. J.	0 • C •		ATM PN 6,7 IF, OUTR
? # ? E		0000	• 00 00	J.	8.		ATM PN 4,5 IF, OUTR
75	.0003		.0001	9.	0.	0.	ATM PN 8,1 IF, OUTR
77	.0001		.0000	0.			ATM PN 2,3 IF, OUTR
38	.3000	.0001	.0000	j.	9.	0.	ATM PN 5,7 IF, INNR
₹9	-9901	.0331	.0000	0.	0.	3.	ATM PN 4,5 TF, INNR
40	0000	•0000	.0001	0.	9.	0.	ATM PN 8,1 IF, INNR
41	.0000	.0000	.0000	0.	ů.	0.	ATM PN 2,3 IF, INNR
42	• 0 1 0 0	.0000	. 6000	.0000	.0000		CMG, -Y SIDE
43	• 0 0 0 0	.0000	• 0000	.0000	.0000		CMG, +Y SIDE
44	.0000	.0000	. 3003	.0000	.0000		CMG, +X SIDE
4=	.0000	.0000	0.	9.	0.	J.	ATM SAS, PN 1
45		0000	0.	0.	0.	0.	ATM SAS, PN 3
47	.onog	.0000	0.	0.	0.	0.	ATM SAS, PN 5
48	.0000	.0000	0.	0.	0.	0.	ATM SAS, PN 7
49	.0001	.0001	.0001	.0002	.0009		SPAR CENTER
50	. 0 0 0 0	.0002	.0000	.0003	.0008	.0004	GRAZCAN CENTER
SUM	. R 257	.0568	• 0 95 2	.0032	.0044	.0149	

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SECTION B

Two-Dimensional Plots of Test Modes

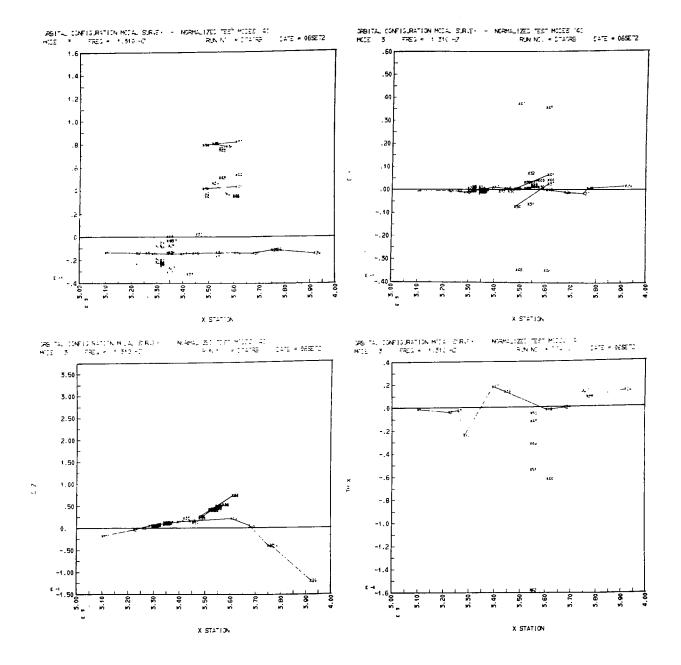
ORBITAL CONFIGURATION MODAL SURVEY DEGREE OF FREEDOM TABLE FOR MODE SHAPES AND DISCRETE MASS MATRIX

NODE		DEGR	EES OF	FRE	EDON			LOCATION	
NO.	ХG	ŊΥ	ΟZ	ΤX	ΤY	TZ	X	Y	Z JESCRIPTION
1	1	2	3	4	5	€	3100.00	0.003	0.000 BASE RNG/OHS SKIRT
2	7	8	9	10	11	12	3223.000	0.003	0.000 OWS/IU INTERFACE
3	13	14	15	15	17	18	3258.555	0.003	0.000 IU/FAS INTERFACE
4	19	20	21				3316.555	81.473	46.683 FAS 02 BOTL1,+Y +Z
5	22	23	24				3316.555	46.683	81.473 FAS 02 BOTL 2,+Y +Z
6	25	26	27				3316.555	-45.683	81.473 FAS 02 BOTL 3,-Y +Z
7	28	29	39				3316.555	-81.473	46.683 FAS 02 BOTL4,-Y +Z
8	31	3 2	33				3316.555	-81.473	-46.683 FAS 02 BOTL5,-Y -Z
9	34	35	36				3316.555	-46.683	-81.473 FAS 02 BOTL6,-Y -Z
10	37	38	39				3341.615	116.067	0.000 FAS/AM/DA IF, +Y
11	4 B	41	42				3341.615	0.003	116.060 FAS/AM/DA IF, +Z
12	43	44	45				3341.615		0.000 FAS/AM/DA IF, -Y
13	46	47	48				3355.700	-82.345	-81.488 FAS/DA IF, -Y -Z
14	49	50	51				3341.615		-116.060 FAS/AM IF, -Z
15	52	53	54				3341.615		-83.0143 FAS/JA IF, +Y -Z
16	55	56	57	58	59	60	3282.365	0.000	0.000 AM TUNNEL/SHEAR WB
17	61	62	63	64	65	66	3394.615	0.003	0.000 AM TUNNEL/STS IF
18	67	68	69	70	71	72	3441.765	0.003	0.000 MDA/STS INTERFACE
19	73	74	75	76	77	78	3605.000	0.000	0.000 MDA CONE/CYL ITRFC
50	73	8 0	81				3297.665	69.051	0.000 N2 TANK, +Y, LOWER
21	82	83	84				3348.365	69.05)	0.000 N2 TANK, +Y, UPPER
22	35	86	87				3297.665	0.000	59.050 N2 TANK, +Z, LOWER 59.050 N2 TANK, +Z, UPPER
23	88	89	90				3348.365	0.003	
24	31	92	93				3297.665	0.00)	
25	94	95	96 96	400	4.0.4	4.02	3348.365	0.00) 0.00)	-69.050 N2 TANK, -Z, UPPER 0.000 CM, FWD BULKHEAD
26	97	9.8		100	101	102	3678.000		D. DOD CM, AFT BULKHEAD
	103	104		105	107	108 114	3751.600 3766.500	0.003 0.003	0.000 SM, FHD BULKHEAD
	109 115	110 116		112 118	113 119	120	3921.500	0.003	0.000 SH, AFT BULKHEAD
	121	122	123	110	112	120	3454.765	0.003	-90.000 LOWER D LATCH, DA
	124	125	125				3532.915	113.500	-11.850 LOWER +Y TRUNNION
	127	128	129				353 2 • 9 15		-11.850 LOWER -Y TRUNNION
	130	131	132				341 8 • 7 65	0.000	100.000 EREP PACKAGE C.G.
	133	134	135				3479.094		-252.500 ATM PN 6,7 IF, OUTR
	136	137	138				3517.701		-252.500 ATM PN 4,5 IF,OUTR
	139	140	141				3572.299		-252.500 ATM PN 8,1 IF, OUTR
	142	143	1.44				3610.906		-252.500 ATH PN 2,3 IF, OUTR
	145	146	147				3479.094		-158.000 ATM PN 6,7 IF, INNR
	148	149	150				3517.701		-158.000 ATH PN 4,5 IF, INNR
	151	152	153				3572.299		-158.000 ATH PN 8,1 IF, INNR
41	154	155	156				3610.906	-27.293	-156.000 ATH PN 2,3 IF, INNR
	157	158		150	161	162	3545.000	-65.905	-181.9925 CMG, -Y SIDE
	163	164	165	166	167	168	3545.000		-181.995 CMG, +Y SIDE
	169	170	171	172	173	174	3610.906	0.00)	-182.000 CMG, +X SIDE
45	175	176					3599.9301	. 54.9331	-207.490 ATM SAS ,PN 1
	177	178						-54. 9301	
	179	180					· ·	9 -54. 9301	
	181	182					3490.0699		-207.490 ATH SAS, PN 7
	1.83	184	185	186	187		3545.000		-240.709 SPAR CENTER
50	188	189	190	191	192	193	3545.000	0.000	-240.709 GRA/CAN CENTER

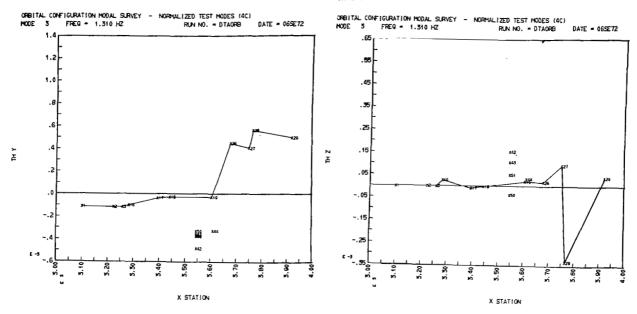
Two dimensional plots of each of the thirth test modes are presented in this section. The data plotted is the translated test quadratures normalized to the 193 x 193 discrete mass matrix. A least squares transformation from all ATM degrees of freedom at nodes 34 through 41 was used to define the three ATM center of gravity rotations given by Node 51. All of the resulting node points included in the plotted data are defined in the degree of freedom table presented on page B-2 of this section.

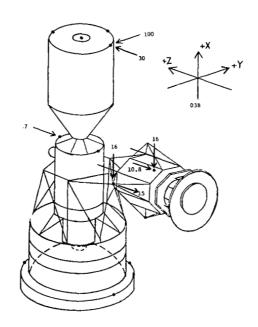
All nodes are plotted versus x station. In the plotted data the ATM is represented by two intersecting lines in each of the planes at the inner and outer ATM Z stations. At the outer ATM Z station the plane is defined by the intersection lines from node 34 to node 37 and from node 35 to node 36. At the inner ATM Z station the plane is defined by the intersection of lines from node 38 to node 41 and from node 39 to node 40. The line connecting node 3 to node 16 is a plotting error and should be ignored.

Plot B-I

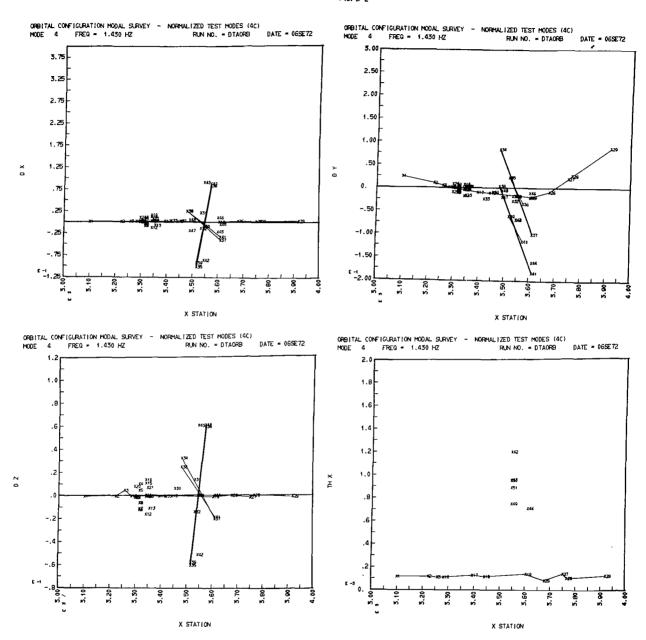


Plot B-I

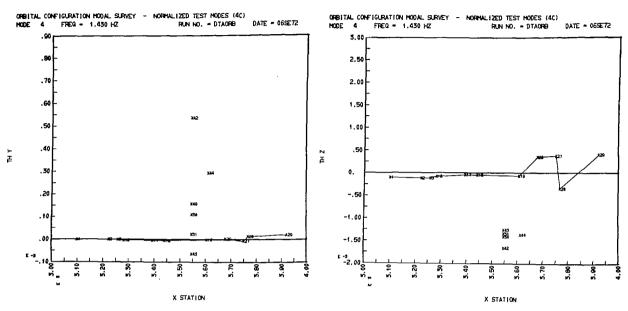


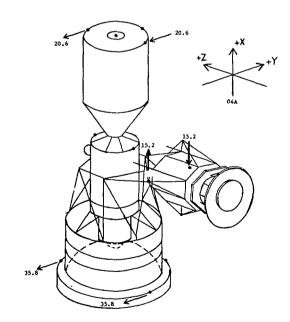


Plot B-2

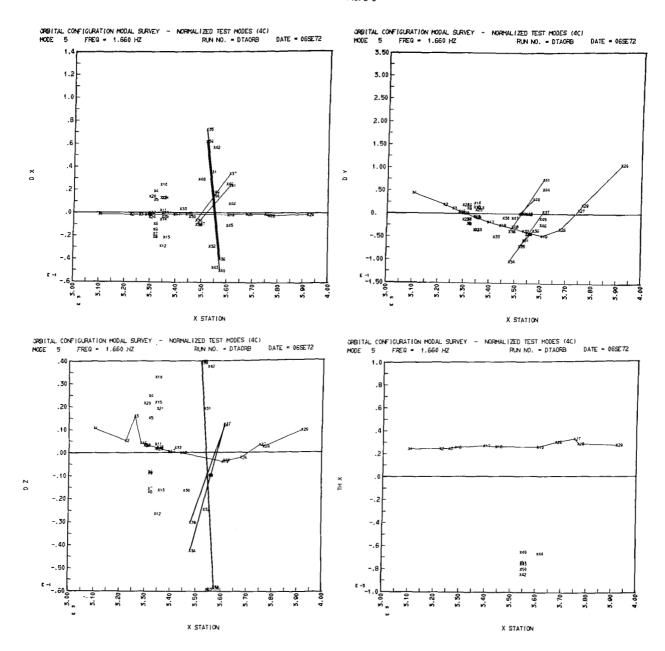


Plot B-2

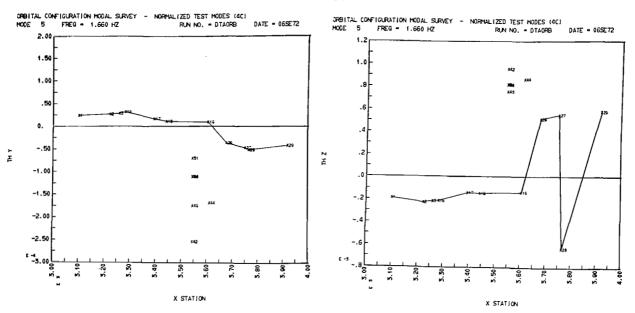


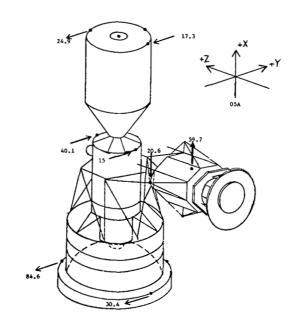


Plot B-3

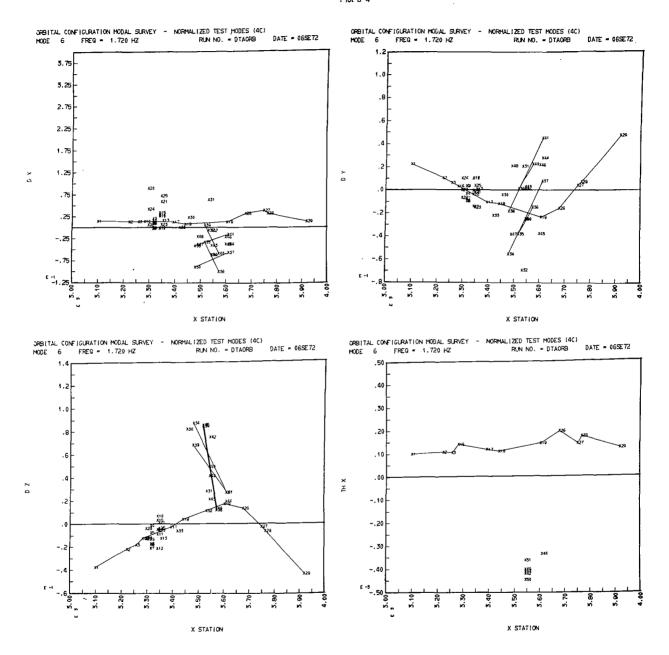


Plot B-3

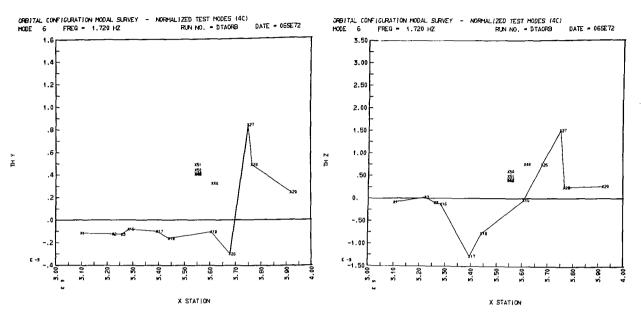


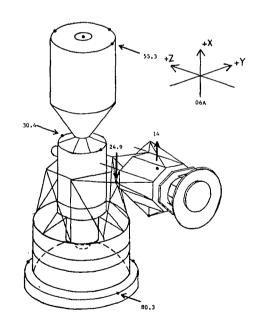


Plot B-4



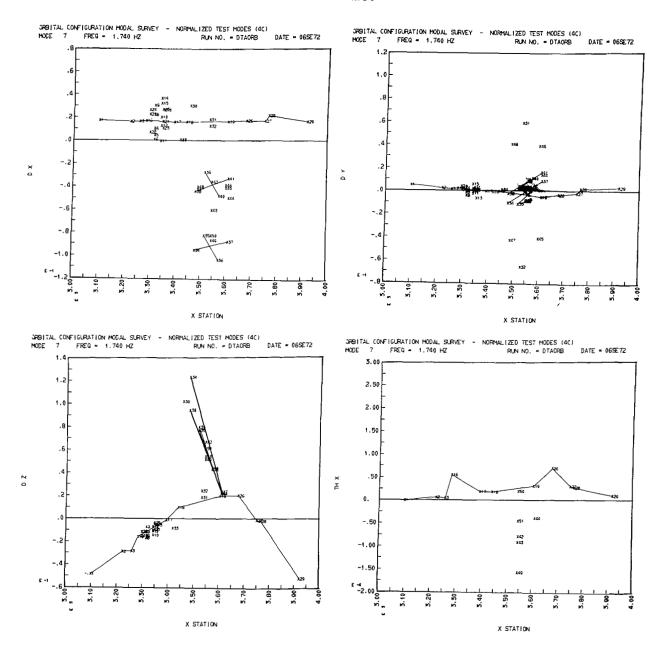
Plot B-4



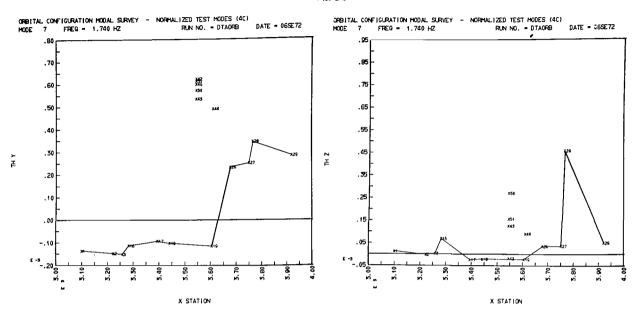


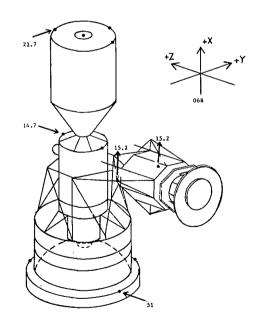
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Plot B-5

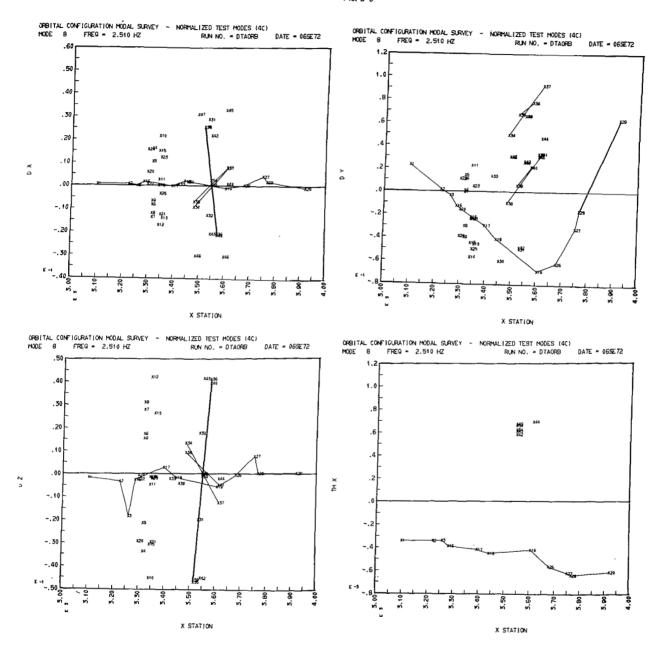


Plot B-5

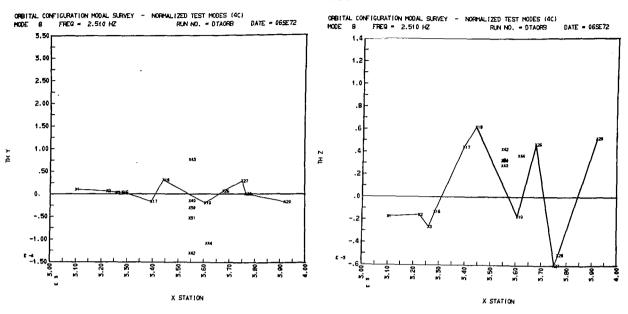


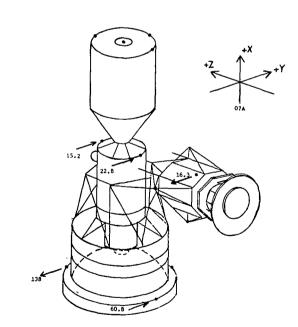


Plot B-6



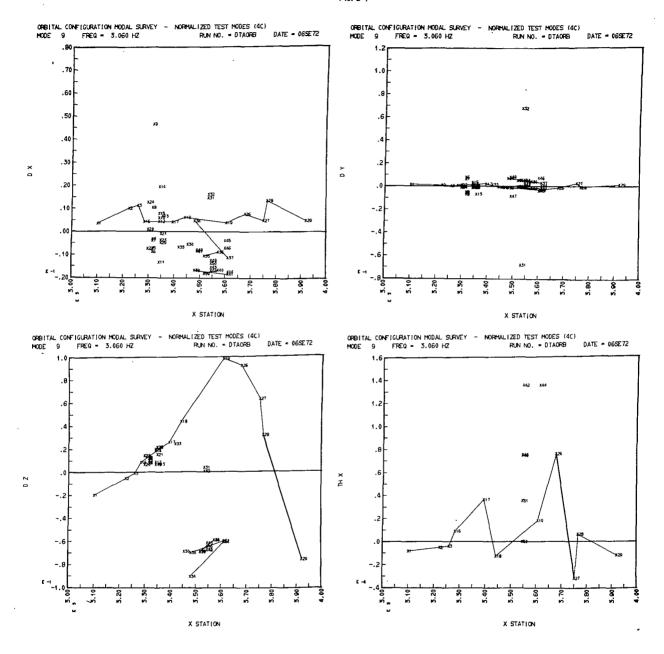
Plot B-6



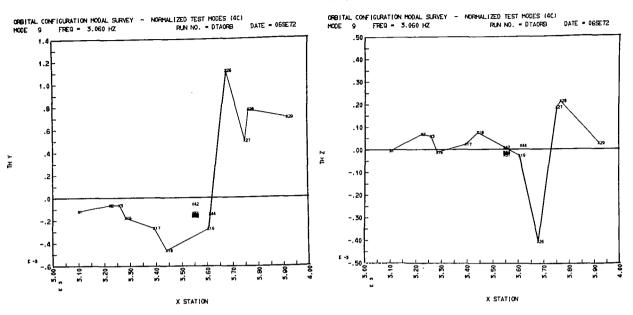


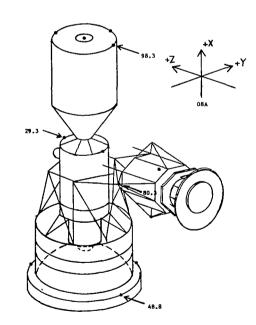
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Plot B-7

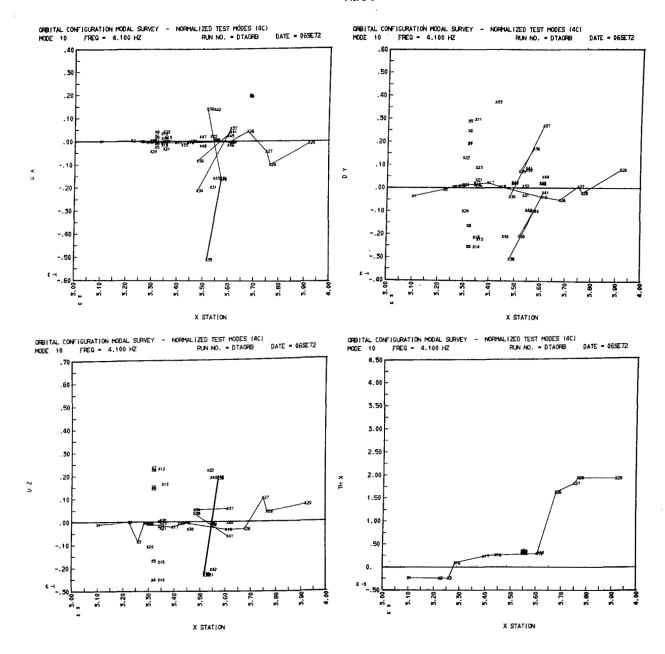


Plot B-7

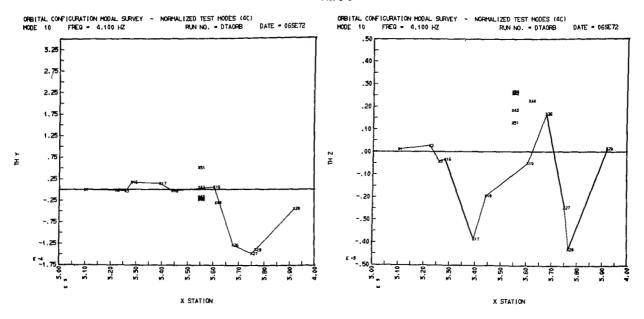


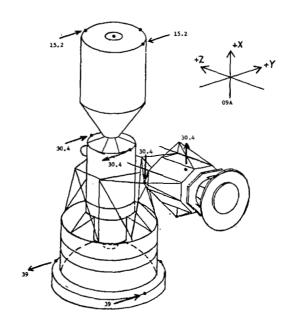


Plot B-8

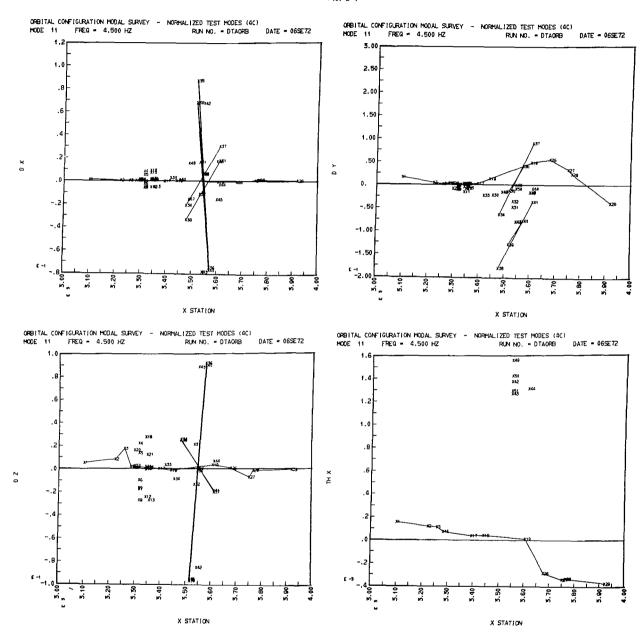


Plot B-8

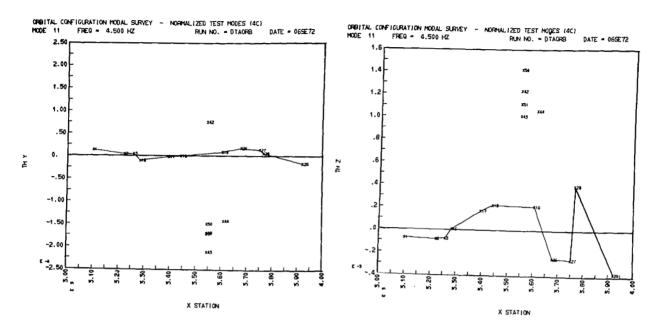


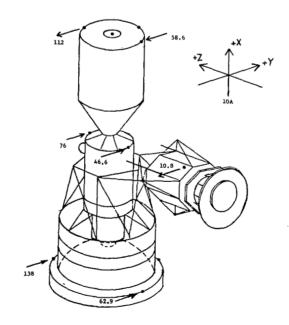


Plot B-9

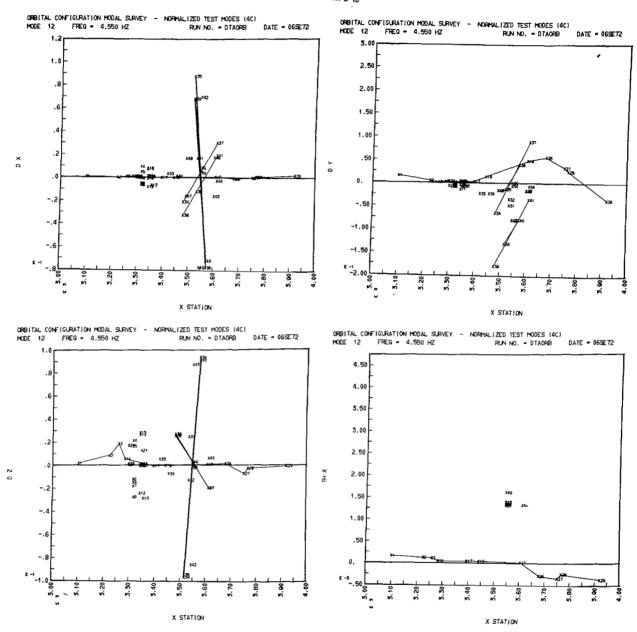


Plot B-9

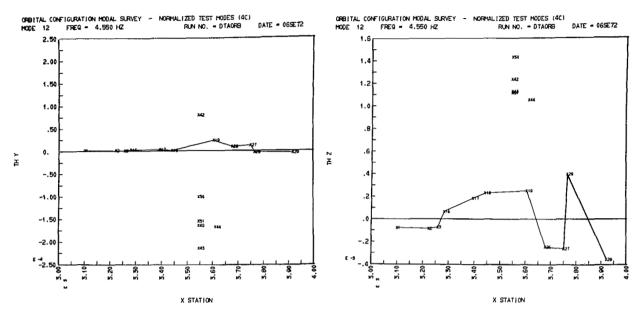


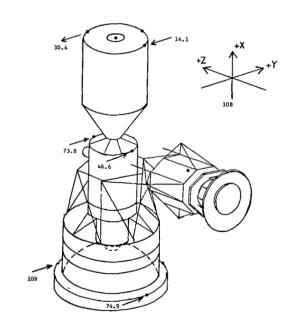






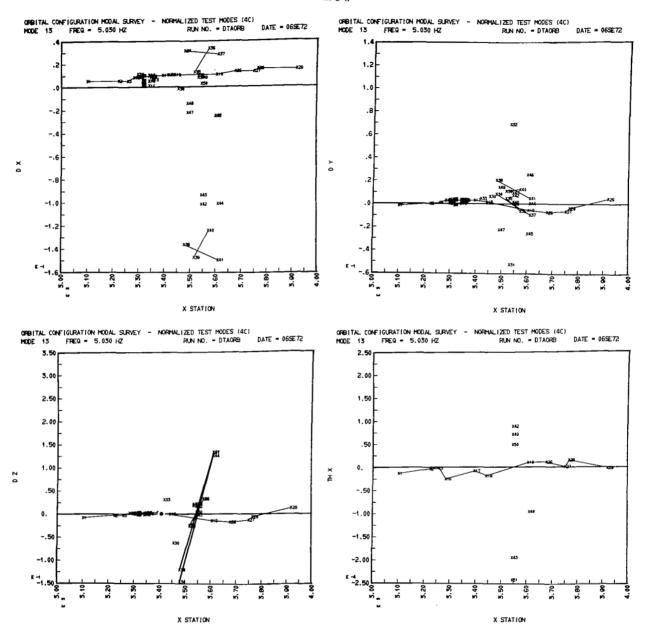
Plot B-10



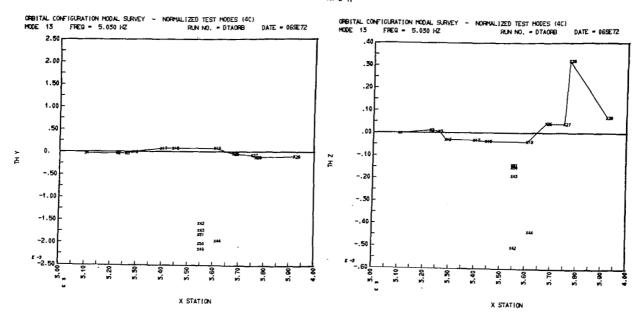


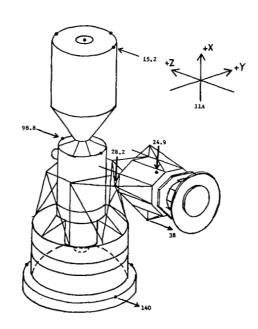
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Plot B-II

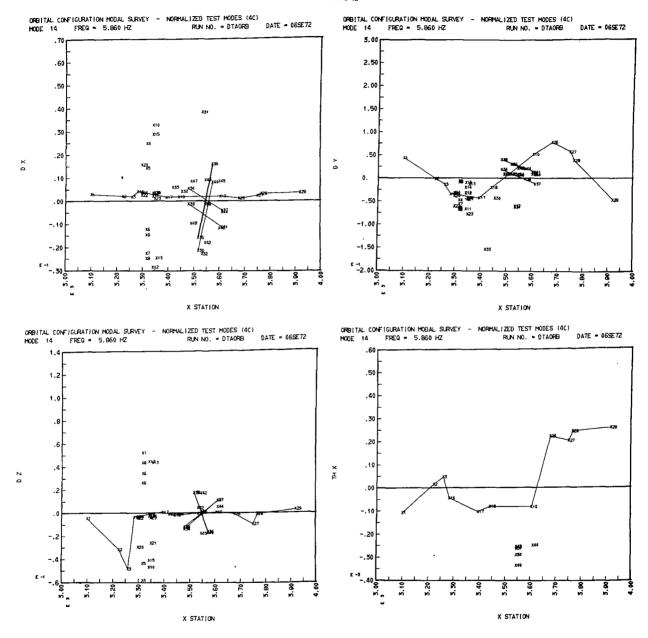


Plof B-II

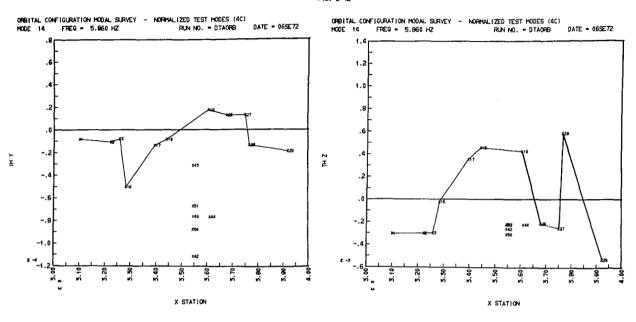


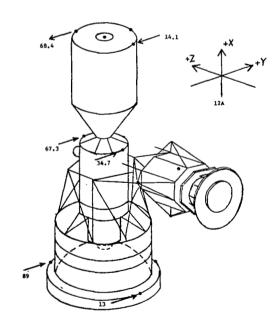


Plot B-12



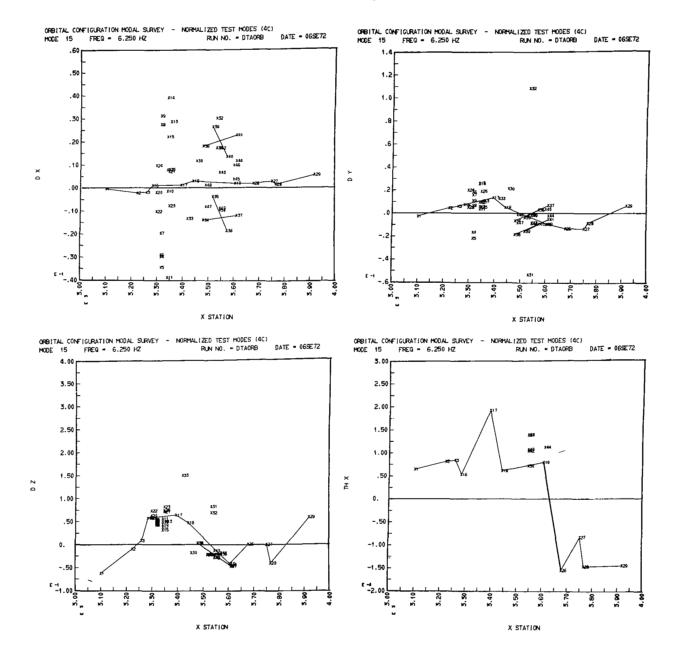
Plot B-12



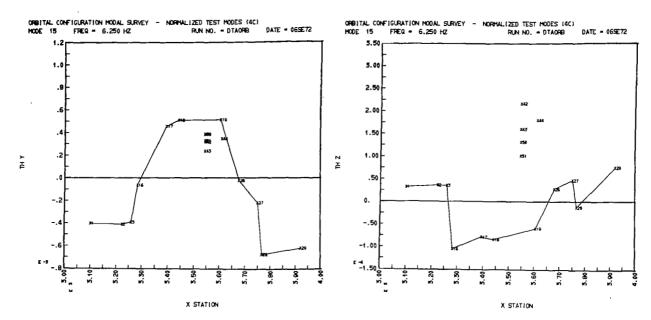


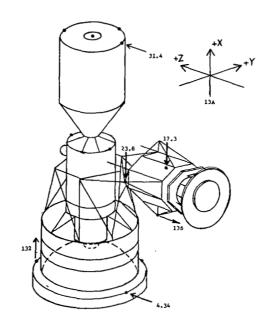
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Plot B-13

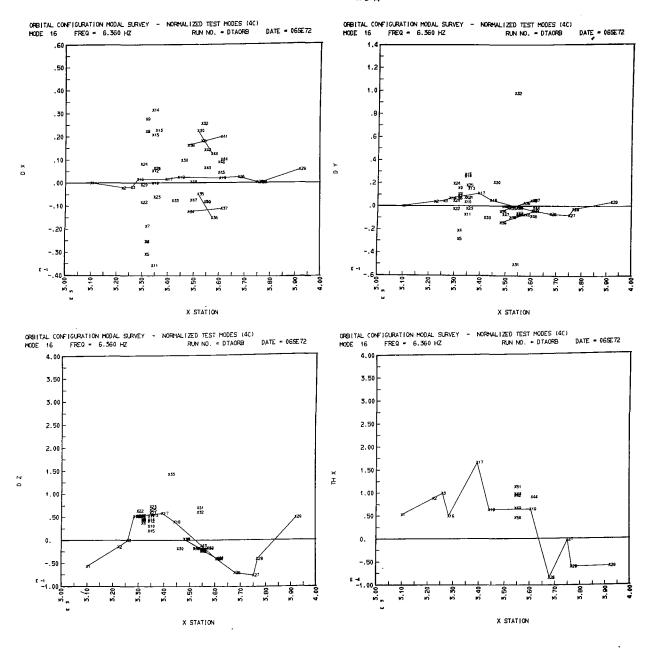


Plot B-13

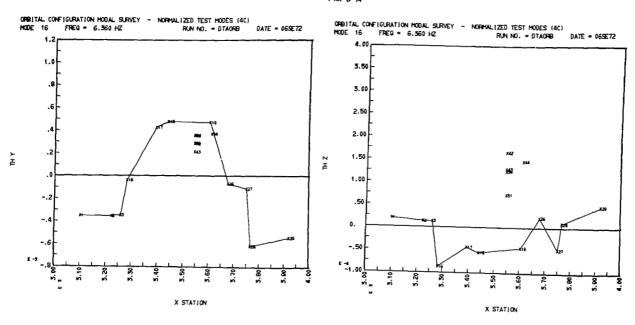


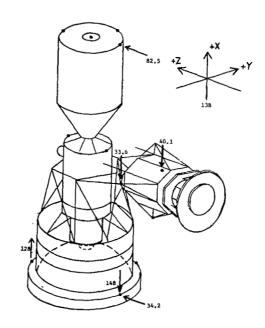


Plot B-14

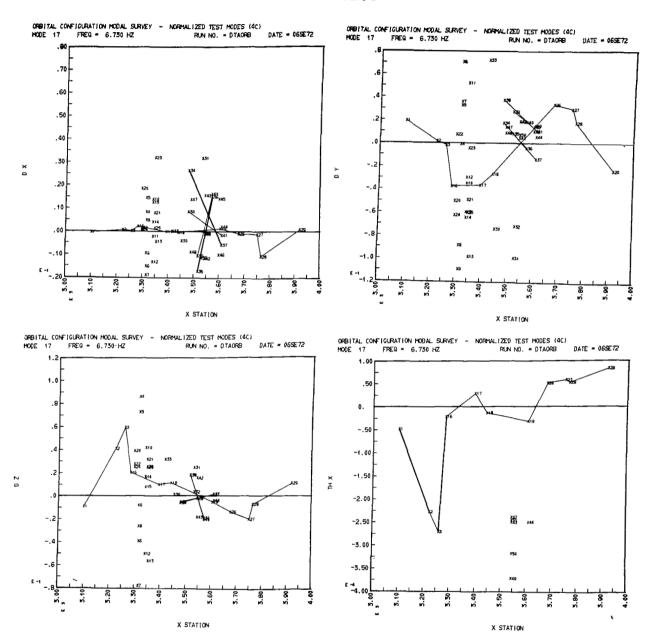


Plot B-14

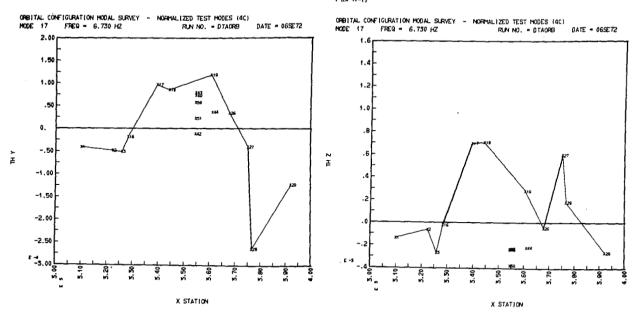


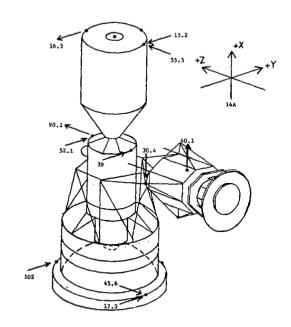


Plot B-15

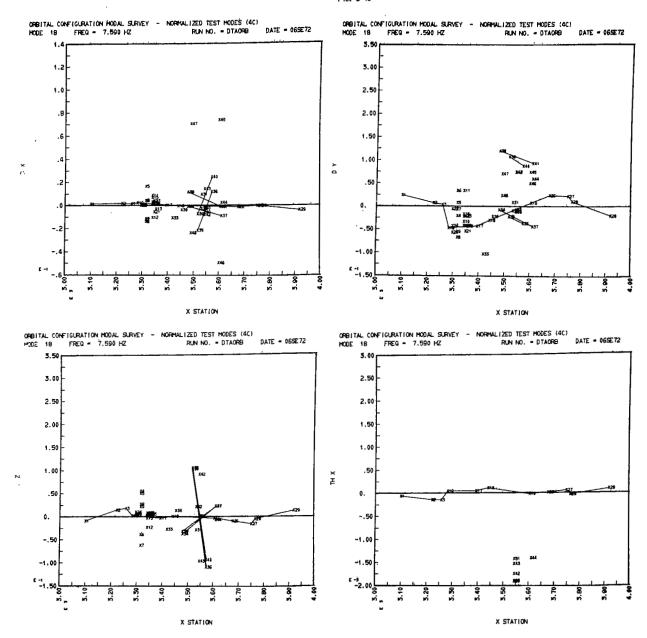




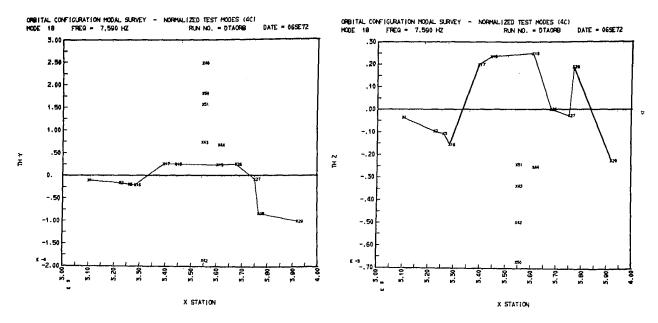


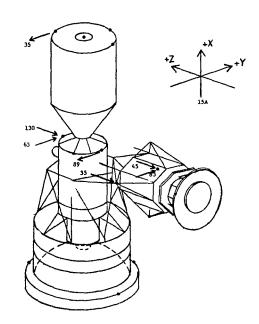


Plot B-16

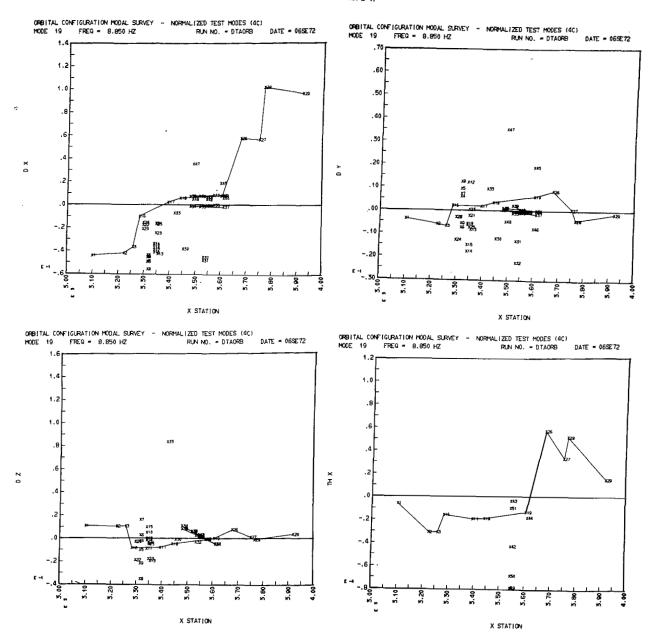


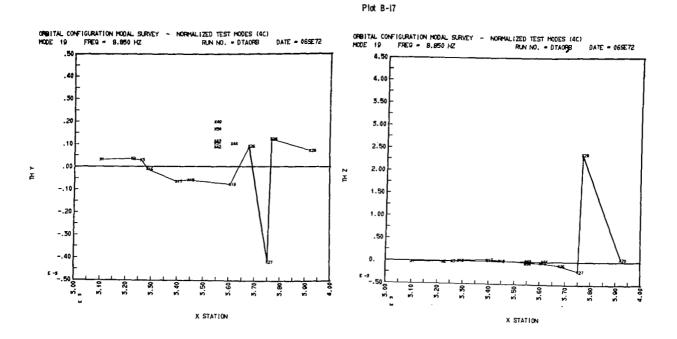
Plot B-16

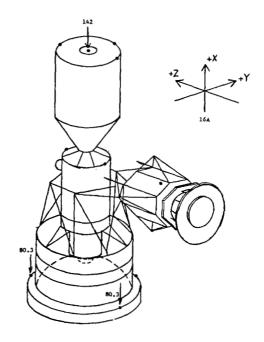




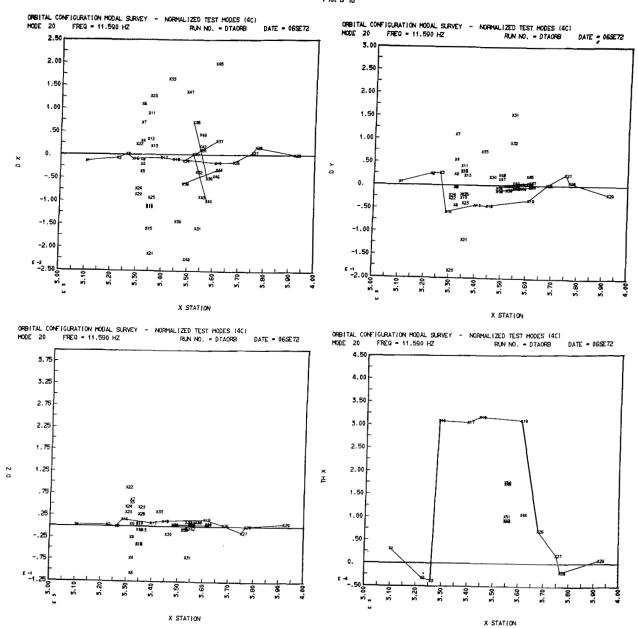
Plot B-17



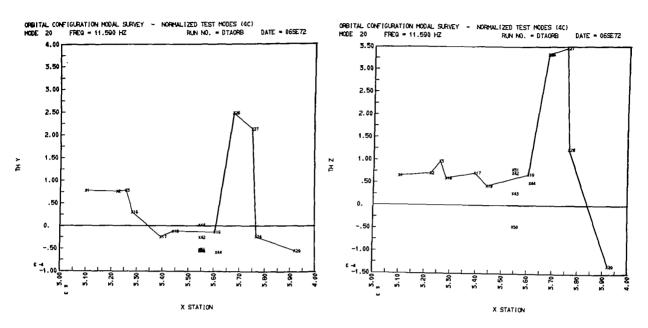


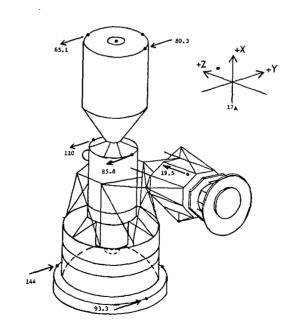


Plot B-18

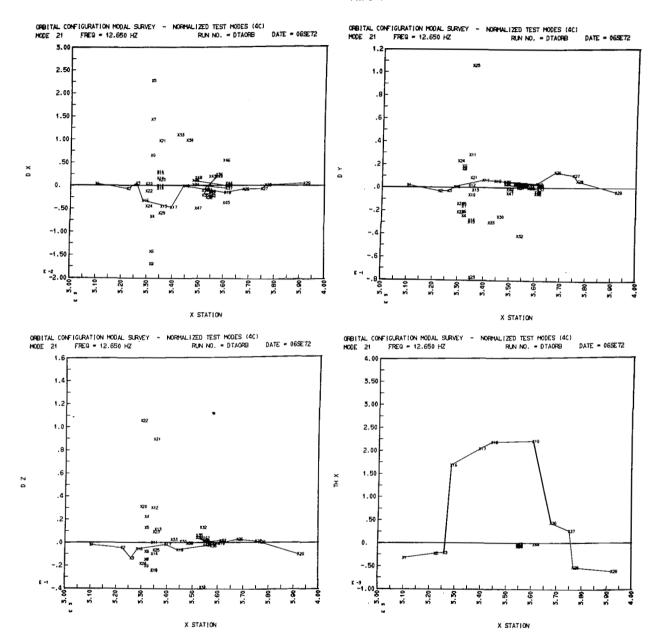


Plot B-18

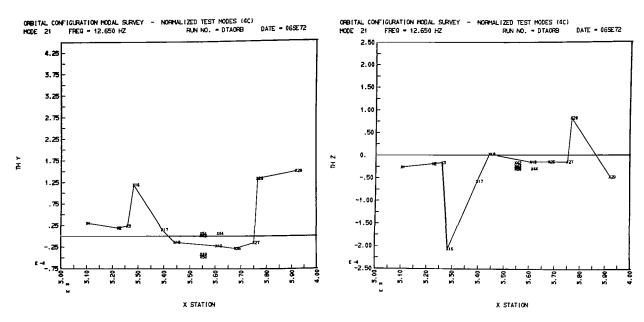


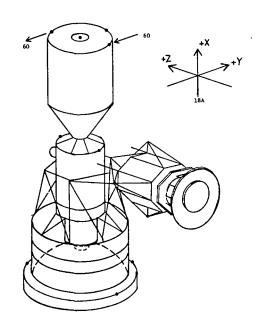


Plot B-19

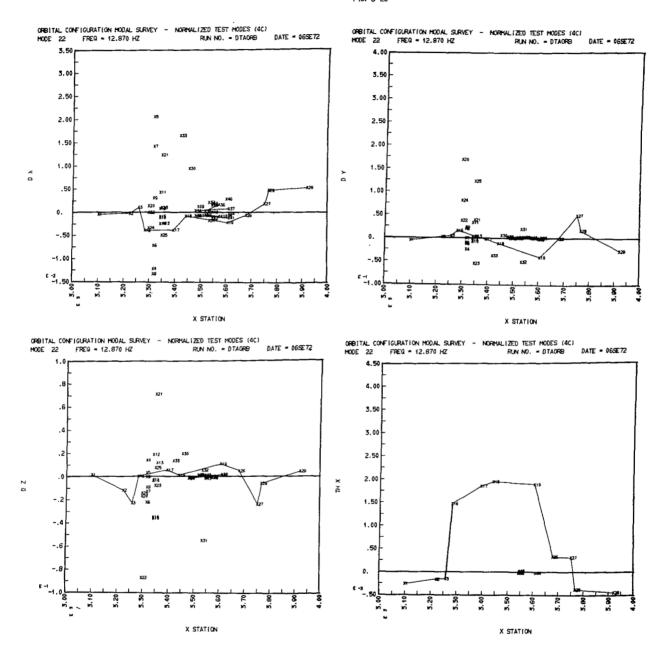


Plot B-19

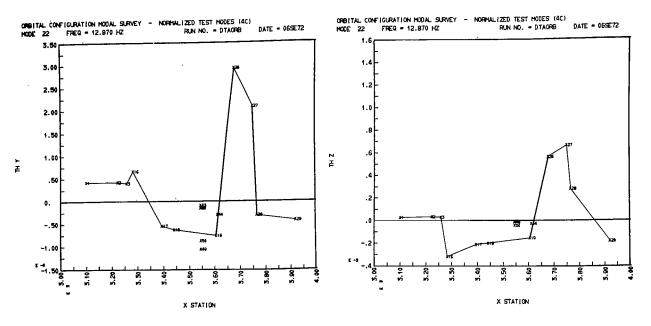


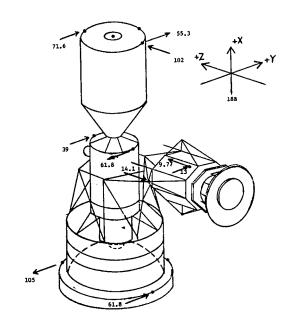


Piot B-20

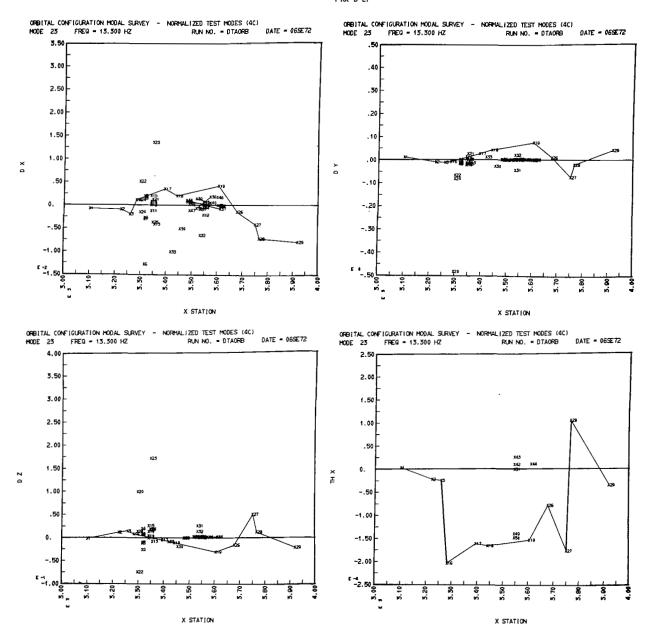


Plot B-20

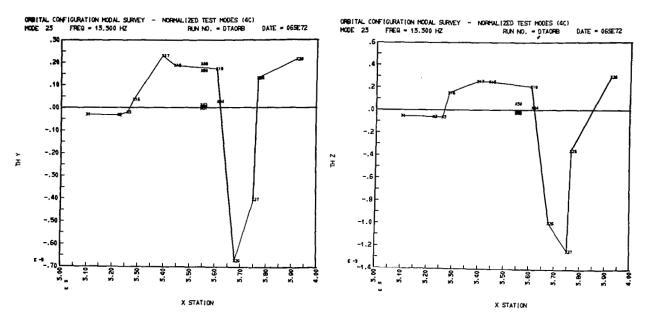


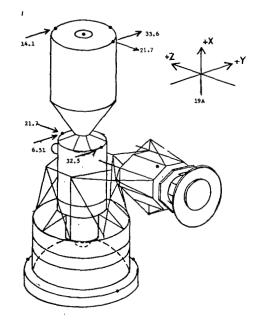


Plot B-2I

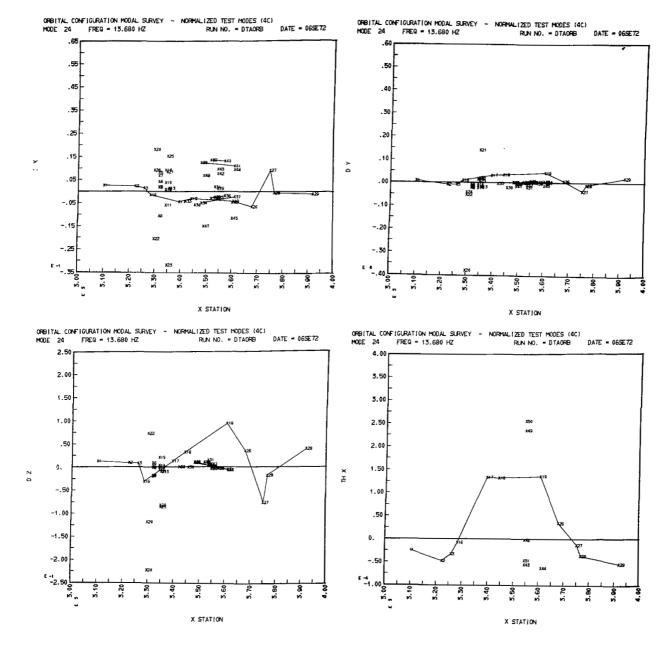


Plot B-21

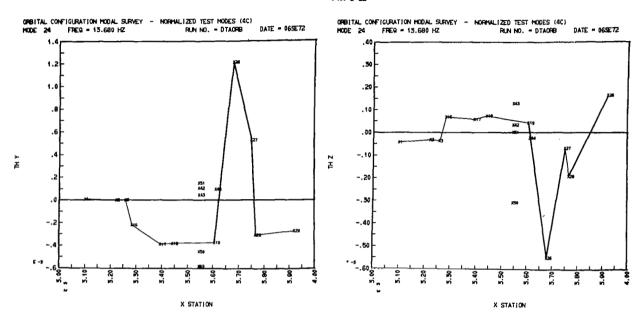


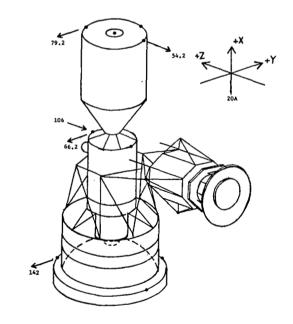


Plot B-22

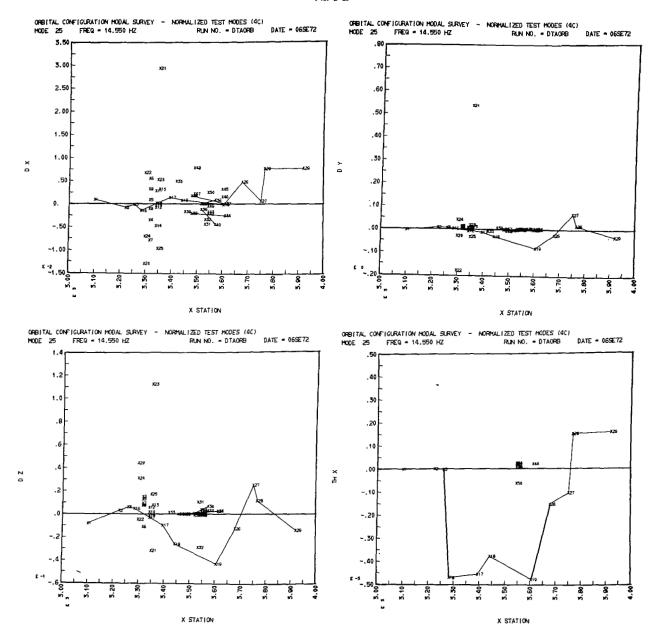


Plot B-22

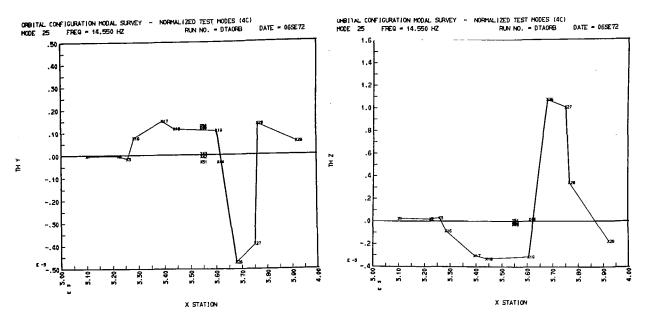


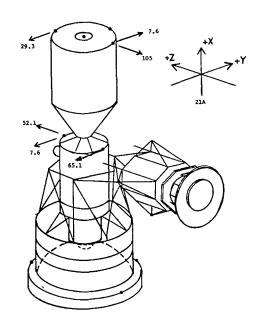


Plot B-23

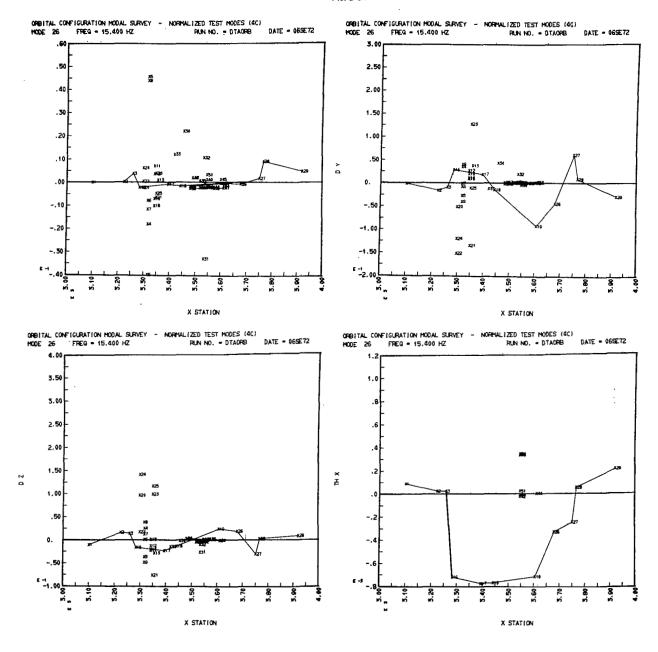


Plot B-23

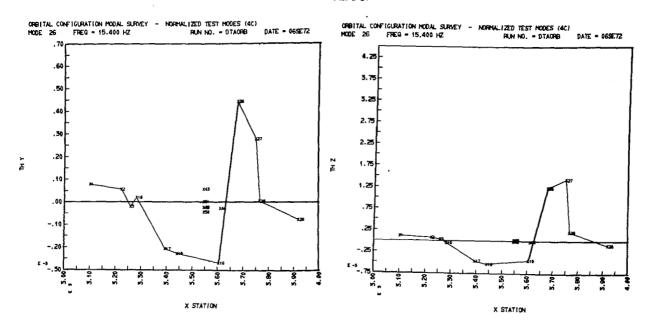


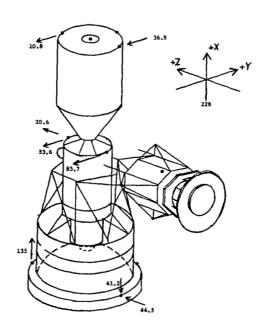


Plot B-24

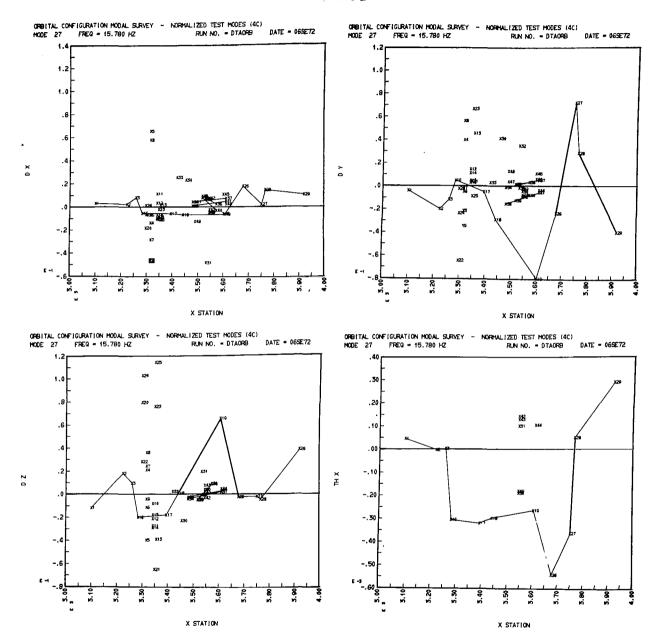


Plot B-24

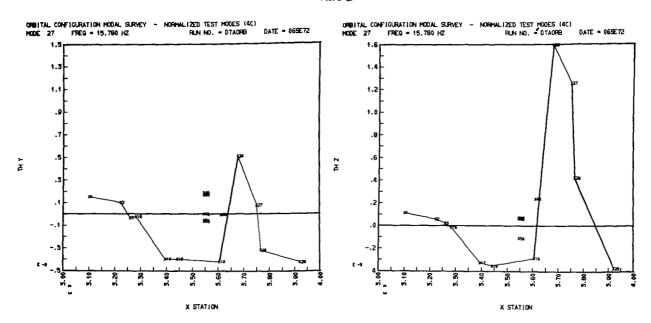


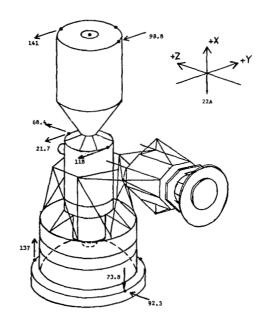


Plot B-25

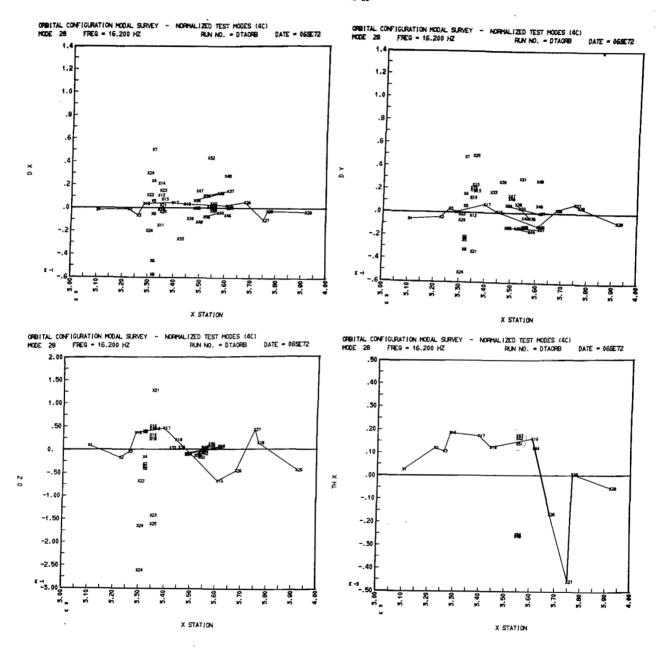


Plot B-25

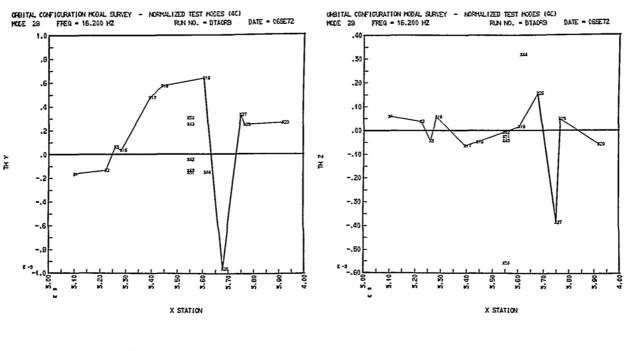


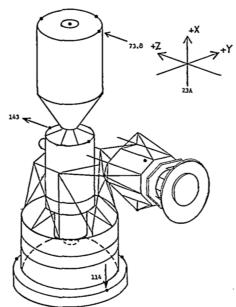


Plot B-26

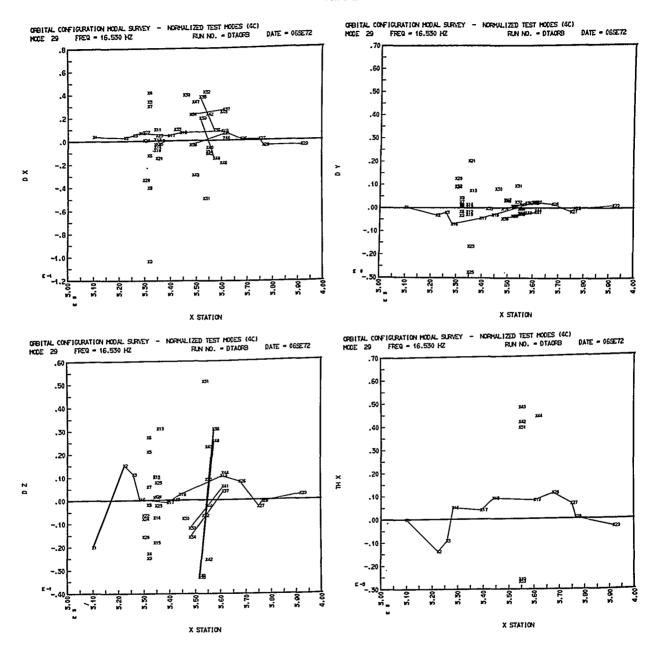


Plot B-26

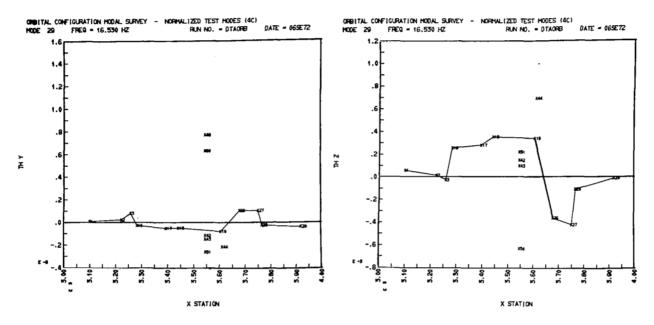


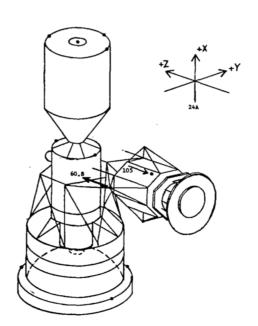


Plot B-27

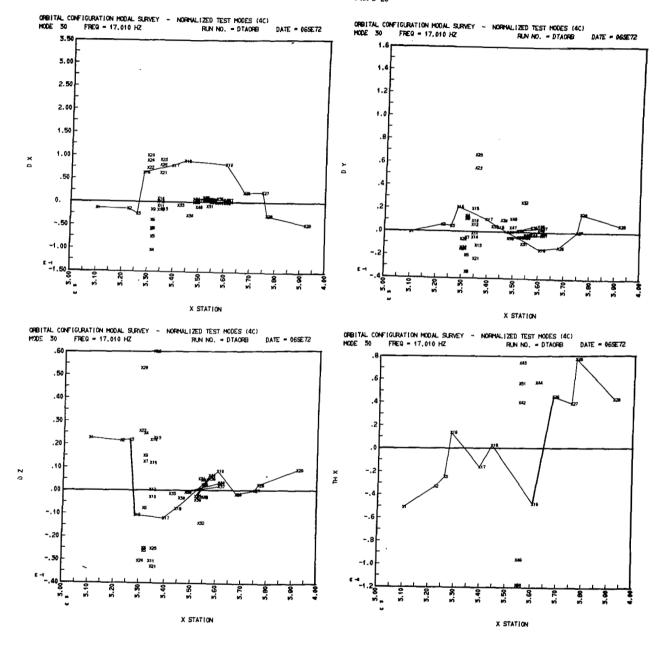


Plot B-27

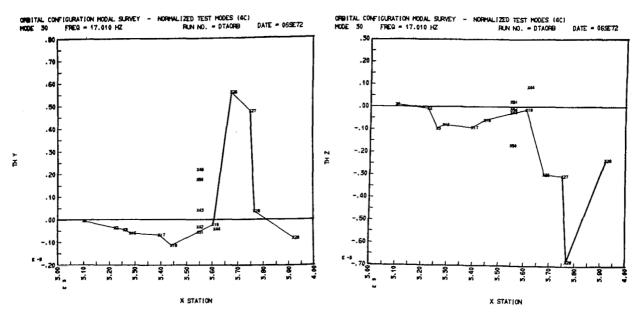


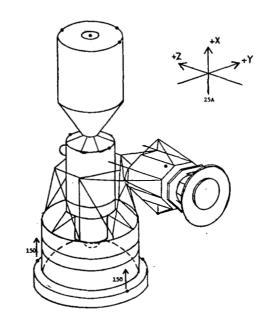






Plot B-28





SECTION C

Analytical Modes GMC Tables

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<u></u>			

The following Tables C-1 through C-40 show GMC data for each of the correlated analytical modes presented in Table 5.17 in the main text of this report. These data are presented in the same manner as the corresponding test data presented in Section A.

TABLE C-1

ANALYTICAL MODE 7 ANALYTICAL FREQUENCY = 1.279 HZ.

COMPONENT	GMC	GMC	GMC	G4C	GMC	GMC
NAME	(DX)	(PY)	(DZ)	(LX)	(TY)	(TZ)
BP/ONS SKIRT/IU/FAS	.0263	.0001	.0059	.0001	.0053	.0020
5-FAS OZ TANKS	•0229	.0001	.0046	0.	8 •	9.
MDA/STS/AM	.0170	.0000	. 00 94	.0300	.0001	0000
6-AM N2 TANKS	.0036	.0000	.0012	a.	0.	0 •
COMMAND/SERVICE 400.	.0253	.0008	. 3135	.0016	.0354	0000
DEPLOYMENT ASSEMBLY	.0021	.0000	.0065	0 •	0.	J •
ATH-PACK, CMGS, 4-SAS	. 2914	.0052	.0680	0300	.0001	.0000
ATM-SPAR CENTER	• 0839	.3001	.0094	.0001	.0027	0.
ATM-GRAZCAN CENTER	.0750	.0000	.3083	·0J01	.0048	.0051
SUM	.5471	.0063	• 4269	.0012	.0184	.0002

TOTAL GM CONTRIBUTION FOR EACH COMPONENT

BR/OWS SKIRT/IU/FAS	.0374
6-FAS 02 TANKS	.0275
MA\STS\AM	.0255
6-4H N2 TANKS	.00+8
COMMAND/SERVICE MOD.	. 3459
DEPLOYMENT ASSEMBLY	.0057
ATM-RACK, CMGS, 4-SAS	. 3646
AT4-SPAR CENTER	. 1952
AT4-GRA/CAN CENTER	. 0883

C-5 TABLE C-2

GENFRALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

ANALYTICAL MODE FREQUENCY= 1.28 42. NODE GMC GMC GMC SMC GMC GMC NODE NO. (XC) (DY) (DZ) (TX) (TY) (TZ) DESCRIPTION .0000 .0115 .0000 .0035 .0030 .0000 BASE RNG/OWS SKIRT .0004 .0032 .0000 .0000 .0000 OWS/IU INTERFACE 2 -.0000 .0004 .0000 .0319 .0000 IU/FAS INTERFACE 3 .0058 .7000 4 -.0000 .0010 0. 0. 0. FAS 02 BOTL1,+Y +Z .0038 5 .0060 8. -.0000 .0009 0. 0. FAS 02 B)TL2,+Y +Z 6 FAS 32 B3TL3,-Y +Z .0060 .0000 .0008 0. 0. 0. 7 .0040 .0007 O. Q. 8. FAS 02 B)TL4,-Y +Z .0000 ٥. G. 8 .0021 .0000 .0007 0. FAS 02 80TL5,-Y -Z 0. 9 .0005 .0010 .0001 G. û. FAS 02 BOTL6,-Y -Z 0. 0. 0. 10 .0005 .0000 .0005 FAS/AM/DA IF, +Y 0. 0. 0. 11 .0000 .0028 .0005 FAS/AM/DA IF, +Z 0. 0. 0. FAS/AM/DA IF, -Y 12 .0010 -.0000 .0005 13 .0001 .0000 .0002 0. 0. 0. FAS/DA IF, -Y -Z 0. 14 .0000 .0000 .0002 0. 0. FAS/AM IF, **-**Z 0. 15 .0001 +Y -Z .0000 .0000 0. 0. FAS/DA IF, .0005 .0000 .0001 .0000 AM TUNNEL/SHEAR WB 16 .0025 .0000 17 .0039 .0000 .0025 .0000 -.6035 .0000 AM TUNNEL/STS IF .0000 18 .0058 .0000 .0038 .0000 -. 0000 MDA/STS INTERFACE -. 0000 MDA CONE/CYL ITRFC 19 .0048 .0000 .0027 -.0000 -.0000 20 .0005 .0000 .0002 N2 TANK, +Y, LOWER 0. 0. 0. 21 N2 TANK, +Y, UPPER .0005 .0000 a 0 0 0 3 0. 0. 0. 22 .0009 .0000 .0001 0. 0. 0. N2 TANK, +Z, LOWER .0000 23 .0010 .0092 0. 0. 0. N2 TANK, +Z, UPPER 24 .0003 0. ٥. 0. .0000 .0001 N2 TANK -Z, LOWER 25 .0003 .0000 .0002 0. 0. 0. N2 TANK, -Z, UPPER 26 .0000 -.0001 .0000 CM, FWD BULKHEAD .0049 .0000 .0000 .0004 27 .0058 .0001 .0156 -.0000 .0000 CM, AFT BULKHEAD 28 .0065 .0001 .0299 .0002 .0008 -.0000 SM, FWD BULKHEAD 29 .0081 .0006 .2671 .0007 .0044 .0000 SM, AFT BULKHEAD LOWER D LATCH, DA 30 -.0002 .0000 .0002 0. 0. 0. 0. 0. 0. 31 .0004 -.0000 .0031 LOWER +Y TRUNNION 0. .0005 .0029 32 .0000 G. 0. LOWER -Y TRUNNION 33 .0013 .0000 .0005 0. 0. ũ. EREP PACKAGE C.G. 34 .0357 .0004 -.0001 0. 0. 0. ATH PN 6,7 IF, OUTR ATM PN 4,5 IF, OUTR 0. 35 . 9488 -.0001 .0006 0. ٥. ATM PN 8,1 IF, OUTR 35 .0737 .0007 .0121 0. 0. 0. 37 .0446 -.0008 .0259 0. 0. 0. ATM PN 2,3 IF, OUTR 38 .0093 .0000 .0005 0. 0. O. ATM PN 6,7 IF, INNR 39 0. .0168 .0004 .0007 0. ٥. ATM PN 4,5 IF, INNR 0. 0. .0315 0. ATH PN 8,1 IF, INNR 40 .0014 .0057 .0135 .0. 41 .0055 -.0003 0. 0. ATM PN 2,3 IF, INNR 42 .0854 .0001 .0012 .0000 .0001 .0000 CMG, -Y SIDE 0000 .0000 43 .0088 .0000 .0016 -.0000 CMG, +Y SIDE .0000 .0000 CMG, +X SIDE 44 .0072 .0654 -.0000 .0003 45 .0004 0. 0. ATM SAS , PN 1 .0004 0. 0. 46 .0006 .0006 0. 0. 0. 0. ATM SAS, PN 3 47 0. .0009 .0009 0. ATM SAS, PN 5 0. ٥. 0. 48 .0011 0. .0011 ٥. 0. ATM SAS, PN 7 .0839 .0094 49 .0001 .0001 .0027 0. SPAR CENTER .0750 50 .0000 .0083 .0001 .0048 .0001 GRA/CAN CENTER ---- .

.0002

.0184

.5471

SUM

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.0012

TABLE C-3

ANALYTICAL MODE 8 ANALYTICAL FREQUENCY = 1.377 HZ.

COMPONENT	GMC	GMC	GMC	G4C	GMC	GHC
NAME	(DX)	(DY)	(DZ)	(TX)	(TY)	(TZ)
BRIONS SKIRTIUIFAS	.0010	.0159	.0015	.0127	.0001	.0057
6-FAS 02 TANKS	.0018	.0027	.0030	0.	0.	0.
MDA/STS/AM	.0001	.0032	.0001	.0021	.0000	.0003
6-AM N2 TANKS	.0002	.0005	.0002	0.	0.	0.
COMMAND/SERVICE 400.	.0002	.1140	. 00 25	.0128	0000	.0033
DEPLOYMENT ASSEMBLY	.0014	.0002	.0013	Ö.	0.	0.
ATM-PACK, CMGS, 4-SAS	.2751	.4167	.0556	. 80 8 4	.0000	.0312
ATM-SPAR CENTER	.0007	.0016	.0001	.0153	.0000	0.
ATM-GRA/CAN CENTER	.0006	.0013	.0001	·0195	.0003	.0348
SUM	.2813	.5561	. 0644	.0527	.0004	.0454

TOTAL GM CONTRIBUTION FOR EACH COMPONENT

BRIOWS SKIRT/IJ/FAS	.0359
5-FAS 02 TANKS	.0076
MD4/STS/AM	.0058
6-AM N2, TANKS	.0008
COMMAND/SERVICE MOD.	.1228
DEPLOYMENT ASSEMBLY	. 1028
ATY-RACK, CMGS, 4-SAS	.7490
AT4-SPAR CENTER	.0177
ATH-GRA/CAN CENTER	.0556

C-7 TABLE C-4

FREQUENCY= 1.38 HZ.

GENFRALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

3

ANALYTICAL MODE

GMC GMC SMC GMC GMC NODE GMC NODE NO. (DX) (DY) (DZ) (TX) (TY) (TZ) DESCRIPTION .9001 .0133 .0002 .0066 .0001 .0035 BASE RNG/OWS SKIRT 1 -.0000 .0023 .0000 .0010 OWS/IU INTERFACE 2 -.0000 .0009 .0038 3 .0000 .0005 .0000 .0000 .0013 IU/FAS INTERFACE 0. .0002 0. 0. FAS 02 BOTL1,+Y +Z 4 .0008 . 9007 0. 0. 0. 5 .0007 .0002 FAS 02 BOTL2,+Y +Z .0002 FAS 02 BOTL3, -Y +Z 6 .0007 .0002 Q. 0. -.0330 0. 7 .0004 FAS 02 BOTL4,-Y +Z .0002 .0008 0. ٥. G. .0003 .0008 0. 0. FAS 02 BOTL5,-Y -Z 8 .0003 0. 8. .0001 .0008 G. 9 .0002 0. FAS 02 BOTL5,-Y -Z 10 .0005 .0000 .0804 G. 0. 0. FAS/AM/DA IF, +Y .0000 O. 0. FAS/AM/DA IF, +Z 11 .0000 .0010 0. 8. 6. 12 .0004 .0000 -3008 8. FAS/AM/DA IF, -Y 0. 13 .0000 -.0000 .0001 0. 0. FAS/OA IF, -Y -Z -.0000 FAS/AM IF, 14 -.0338 .0002 0. 0. 0. - Z 15 .0000 .0000 0. FAS/DA IF. +Y -Z .0000 0. 0. .0000 .0000 .0000 .0002 .0096 .0001 AM TUNNE_/SHEAR WB 15 . 9000 .0000 .0005 .0000 AM TUNNEL/STS IF 17 .0003 .0000 .0000 .0000 .0008 .0002 MDA/STS INTERFACE 18 .0010 .0000 .0019 .0030 19 .0000 .0000 .0006 .0000 MDA CONE/CYL ITRFC .0001 0. 20 .0000 .0001 0. 0. N2 TANK, +Y, LOWER .0001 G. 0. 21 .0000 .0001 0. N2 TANK, +Y, UPPER .0001 N2 TANK, +Z, LOWER 22 .0000 .0000 0. 0. 0. N2 TANK, +Z, UPPER 23 .0000 .0000 .0002 0. 0. 0. N2 TANK -Z, LOWER .0000 24 .0000 .0001 0. 0. 0. .0000 0. .0000 .0000 0. N2 TANK, -Z, UPPER 25 0. .0000 26 .0001 .0000 .0005 .0001 CM, FND BULKHEAD .0000 27 .0046 .0001 .0004 .0000 .0003 CM, AFT BULKHEAD .0000 28 .0001 .0093 .0002 .0009 .0000 .0005 SM, FWD BULKHEAD .0010 -.0001 29 .0022 .0025 SM, AFT BULKHEAD .0001 .1000 g. 0. 0. 30 .0000 .0006 .0000 LOWER D LATCH, DA .0004 0. LOWER +Y TRUNNION 31 .0008 -.0004 0. 0. 32 .0006 -.0005 .0009 û. G. 0. LOWER -Y TRUNNION .0005 0. 0. O. 33 .0000 EREP PACKAGE C.G. .0000 0. 0. G. .0045 .0480 34 .0023 ATM PN 6,7 IF, OUTR .0057 0. 35 .0618 ·0083 0. 0. ATM PN 4,5 IF, OUTR 36 .0538 .0091 .0149 0. 0. Û. ATM PN 8,1 IF, OUTR .0704 .0049 0. 0. 37 ٥. ATM PN 2,3 IF, OUTR .0148 0. O. ATM PN 6,7 IF, INNR 38 -.0902 -.0001 .0004 0. 39 .0275 .0033 8. 0. ATH PN 4,5 IF, INNR .0053 0. ATM PN 8,1 IF, INNR ATM PN 2,3 IF, INNR 40 .0529 .0507 .0047 0. 0. ũ. ·0190 .1756 41 .0024 0. 0. 0. .0001 .0000 .0004 42 .0055 .0053 CMG, -Y SIDE .0148 .0002 .0000 43 .0145 .0051 .0050 .0006 CMG, +Y SIDE -.0008 44 .0417 .0001 .0001 .0003 .0001 CMG, +X SIDE 45 .0005 0. ATM SAS , PN 1 .0005 0. Û. 0. 0. 0. 0. 46 .0003 .0003 0. ATM SAS, PN 3 0. 47 .0005 .0005 0. 0. ٥. ATH SAS, PN 5 48 ٥. 0. .0003 .0003 0. 0. ATH SAS, PN 7 49 .0001 .0153 .0007 .0016 .0000 SPAR CENTER ٥. 50 .0006 .0195 .0003 .0013 .0001 .0348 GRA/CAN CENTER ------------------------

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.0454

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-0644

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SUM

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TABLE C-5

ANALYTICAL MODE 9 ANALYTICAL FREQUENCY = 1.643 HZ.

COMPONENT	GMC	GMC	GMC	G4C	GMC	GYC
NAME	(DX)	(YG)	(DZ)	(X7)	(TY)	(TZ)
BRIONS SKIRTIUIFIS	.6123	.0387	.0975	.0.28	.6223	.0134
5-FAS OZ TANKS	.0187	.0114	.0120	0.	0.	0.
MDA/STS/AM	.0050	.0136	.0081	.0377	.0818	.0017
5-AM N2 TANKS	.0015	.0015	.0027	0 •	0 •	0 •
COMMAND/SERVICE MOD.	.0076	.1007	.1006	.0192	.0025	.0026
DEPLOYMENT ASSEMBLY	.0026	.0111	.0129	Ø •	0.	0.
ATM-RACK, CMGS, 4-54S	.0983	.0408	. 1594	.0301	.0001	.0001
ATM-SPAR CENTER	.0264	.0108	. 0287	.0028	.6011	0.
ATM-GRA/CAN CENTER	•U251	.0084	. ü256	.0343	.0026	.0329
SUM	• 1974	.2372	• 4475	.0569	.0303	.0205

TOTA. GM CONTRIBUTION FOR EACH COMPONENT

BR/OWS SKIRT/IU/FAS	.2259
6-FAS 02 TANKS	.0421
MDA/STS/AM	.0379
6-AM N2 TANKS	.0058
COMMAND/SERVICE MOD.	• 2232
DEPLOYMENT ASSEMBLY	.0257
AT1-RACK, CMGS, 4-SAS	.2988
ATM-SPAR CENTER	.0697
AT1-GRA/CAN CENTER	.0639

SUM

•1974 •2372 •4475

C-9 Table C-6

GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

	AN	ALYTICAL	HODE	9	FREQU	ENCY= 1	L.64 HZ.
NODE NO.	GMC (DX)	GMC (DY)	GM C (DZ)	GMC (TX)	GMC (TY)	GMC (TZ)	NODE Description
1	.0038	•0316	.0790	•0223	•0137		BASE RNG/OWS SKIRT
5	.0030	•0022	.0059	.0074			OWS/IU INTERFACE
3	.0015	.0012	.0075		.0043	.0032	IU/FAS INTERFACE
4	.0006		.0G75	0.	0.	0.	FAS 02 BOTL1,+Y +Z
5	.0004	.0023	.0039	0.	0.	G.	FAS 02 BOTL2,+Y +Z
6	0001	.0024	.0000	0.	0.	0.	FAS 02 83TL3,-Y +Z
7	.0024	.0007	.0003	0.	0.		FAS 02 BOTL4, -Y +Z
8	.0066	.0011	.0002	0.	0.	0.	FAS 02 BOTL5, -Y -Z
g	.0087	.0043	.0000	0.	0.		FAS 02 B3TL6,-Y -Z
10	.0003	.0000	.0021	0.	0.		FAS/AM/DA IF, +Y
11	.0002	.0033	.0001	0.	0.		FAS/AM/DA IF, +Z
12	.0030	.0001	.0014	G •	0.	0.	FAS/AM/DA IF, -Y
13	.0004	0002	.0002	0.	0.		FAS/DA IF, -Y -Z
14	.0011	.0006	.0001	0.	0.	0.	FAS/AM IF, -Z
15	.0001	0000	.0001	0.	0.	0.	FAS/DA IF, +Y -Z
16	.0008	.0001	.0014	.0006	.0004	.0003	AM TUNNEL/SHEAR WB AM TUNNEL/STS IF
17	.0012	.0008	.0000	.0018	.0003	.0002	AM TUNNEL/STS IF
18	.0017	.0839	.0012	.0027	.0510	.0010	MDA/STS INTERFACE
19	.0014	.0088	.0055	.0026	.0001	.0001	MDA CONE/CYL ITRFC
20	.0000	.0000	.0012	0 •	0.	0.	N2 TANK, +Y, LOWER
21	.0000	.0000	.0007		0.	0.	NZ TANK, +Y, UPPER
22	0000	.0062	.0003	0.	0.	0.	N2 TANK, +Z, LOWER
23	.0000	.0006	.0001	0 •	0.	0.	N2 TANK, +Z, UPPER
24	.0007	.0005	.0003	0.	0.	0 •	N2 TANK -Z, LOWER
25	.0008	.0002	.0001	0.	0.	0.	N2 TANK, -Z, UPPER
26	.0018	.0045	.0029	.0018	.0093		CM, FWD BULKHEAD
27	.0023	•0003	.0009		.0004		CM, AFT BULKHEAD
28	.0014	.0028	.0034	•0030	.0004	• 0002	SM, FWD BULKHEAD
29	.0020	.0931	.0934				SH, AFT BULKHEAD
30	.0014	.0000	.0066	9.	0.	0.	LOWER D LATCH, DA
31 32	.0001 .0010	•0085 •0009	.0017		0. 0.	0 • 0 •	LOWER +Y TRUNNION LOWER -Y TRUNNION
33	.0000	.0017	.0000	0.	0.	0.	EREP PACKAGE C.G.
34	.0046	.0179	.0475	8.	0.	0.	ATM PN 6.7 IF.OUTR
35	.0371	.0074	.0049		0.	0.	ATM PN 4,5 IF, OUTR
36	.0059	.0037	.0293	0.	0.	0.	ATH PN 8,1 IF, OUTR
	.0162		.0014	0.			ATH PN 2,3 IF, OUTR
38	.0013	.0045	.0332	0.	ŏ.	0.	ATH PN 6,7 IF, INNR
39	.0192	.0009	.0031	0.	0.	0.	ATH PN 4,5 IF, INNR
40	0001	0007	.0212	0.	0.	0.	ATH PN 8,1 IF, INNR
41	.0054	.0050	.0044	0.	0.	0.	ATH PN 2.3 IF. INNR
42	.0060	.0001	.0010	.0000	.0000	.0000	
43	.0001	.0002	.0114	.0001	.0001	.0001	· •
44	.0016	.0007	.0021	.0000	.0000	.0000	CHG, +X SIDE
45	.0002	.0002	0.	8.	0.	0.	ATM SAS , PN 1
¥6	.0007	.0007	0. •	0.	0.	0.	ATH SAS, PN 3
47	0000	0000	0.	0.	0.	0.	ATM SAS, PN 5
48	.0000	.0000	0.	0.	0.	0.	ATM SAS, PN 7
49	.0264	.0108	.0287	.0028	.0011	0.	SPAR CENTER
£0	.9251	.0084	.0256	.0043	.0326		GRAZCAN DENTER

.0669 .0303

TABLE C-7

ANALYTICAL MODE 10 ANALYTICAL FREQUENCY = 1.670 Hz.

COMPONENT	GMC	GMC	GMC	G4C	GMC	GMC
NAME	(XD)	(PY)	(DZ)	(TX)	(TY)	(TZ)
BRIONS SKIRT/IU/FAS	.0107	.0688	.0585	.0575	.0146	.0232
5-FAS OZ TANKS	.0070	.0113	.0190	G .	€.	3 .
MDA/STS/AM	.0043	.0226	.0066	.0103	.0013	.0025
5-AM N2 TANKS	.0025	.0021	.0008	0.	G •	0.
COMMAND/SERVICE 400.	.0077	. 1608	.0617	.0260	.0029	.0089
DEPLOYMENT ASSEMBLY	.0030	.0094	.0087	0.	0.	0.
ATM-PACK, CMGS, 4+54S	.0842	.0796	.1013	.0301	.0000	.0002
ATH-SPAR CENTER	.0165	.0185	.0195	.0058	.0007	0.
ATM-GRA/CAN CENTER	.0133	.0183	.0169	.0379	.0008	.0041
SUM	.1490	.3913	. 2930	.1376	.0202	.0390

TOTAL GH CONTRIBUTION FOR EACH COMPONENT

BR/OWS SKIRT/IU/FAS	• 2334
6-FAS 02 TANKS	• J372
MA/STS/AM	.0474
6-AM N2 TANKS	.0054
COMMAND/SERVICE MOD.	· 263 0
DEPLOYMENT ASSEMBLY	. 0211
ATM-RACK, CMGS, 4-SAS	. 2654
AT1-SPAR CENTER	.0609
AT1-GRA/CAN CENTER	.0613

C-11 TABLE C-8

GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

ANALYTICAL MODE 10 FREQUENCY= 1.67 HZ.

NODE	GMC	GMC	GM C	GMC	GMC	GMC	NODE
NO.	(xa)	(DY)	(DZ)	(TX)	(TY)	(TZ)	DESCRIPTION
1	.0030	.0570	. 0 45 4	.0298	.0386		BASE RNG/OWS SKIRT
2	.0011	.0840	.0041	.0106	.0031		OWS/IU INTERFACE
3	.0011	.0023	.0034	.0171	.0329	.0048	IU/FAS INTERFACE
4	.0037	.0007	•0014	0.	0.	0.	FAS 02 BOTL1,+Y +Z
5	0001	.0029	.0001	0.	0.	0.	FAS 02 BOTL2,+Y +Z
5	• 0003	.0027	.0028	0.	0.	0.	FAS 02 BOTL3,-Y +Z
7	•0313	.0007	.0065	0.	0.	0.	FAS 02 B)TL4,-Y +Z
8	0000	.0013	.0051	0 •	0.	0.	FAS 32 BOTL5,-Y -Z
9	-0017	.0030	.0020	8.	0.	а.	FAS 32 BOTL6,-Y -Z
10	.0030	.0000	.0016	0 •	0.	0.	FAS/AM/DA IF, +Y
11	.0031	.0843	.0000	0.	0.	9•	FAS/AM/DA IF, +Z
12	-0010	.0001	.0037	0.	0.	0.	FAS/4H/D4 IF, -Y
13	.0000	0001	.0002	0.	0.	0.	FAS/DA IF, -Y -Z
14	•0009	.0011	.0000	0 •	6 •	0.	FAS/AM IF, -Z
15	•0005	.0001	.0001	O •	0.	0.	FAS/DA IF, +Y -Z
16	.0006	.0002	.0006	.0008	.0033	•û006	AM TUNNEL/SHEAR HB
17	.0010	.0013	.0001	.0025	.0002	.0004	AM TUNNE_/STS IF
18	.0014	•9063	.0014	.0040	.0007	0017	MDA/STS INTERFACE
19	-0011	.0148	• 0 0 4 5	.0030	.0001	.0000	MDA CONE/CYL ITRFC
20	.0007	.0000	.0001	G •	0.	0.	N2 TANK, +Y, LOWER
21	•00 07	.0000	,0004	0.	0.	0.	N2 TANK, +Y, UPPER
22	.0000	.0003	.0001	0.	0.	0.	N2 TANK, +Z, LOWER
23	• 7800	.0008	0 00 0	0.	0.	0.	N2 TANK, +Z, UPPER
24	•0005	.9087	.0001	0.	0.	C •	N2 TANK -Z, LOHER
25	.0006	.0003	* 0 00 0	0.	0.	0.	N2 TANK, -Z, UPPER
25	.0013	.0078	.0033	.0035	.0002		CM, FHO BULKHEAD
2 7	.0015	.0003	.0000	.0038	.0002		CM, AFT BULKHEAD
28	.0021	.0044	.0018	.6070	.0001		SM, FHD BULKHEAD
29	•0027	•1483	.0567	.0118	•0023		SM, AFT BULKHEAD
30	.0010	.0001	.0042	0.	0.	0.	LOWER D LATCH, DA
31	•0015	0001	.0038	0.	0.	0.	LOWER +Y TRUNNION
32	.0004	.0071	.0007	0 •	0.	0.	LOWER -Y TRUNNION
33	.0000	.0024	.0000	0 •	0.	0.	EREP PACKAGE C.G.
34	.0134	.0466	.0145	0.	0.	0.	ATM PN 6,7 IF, OUTR
35	0003	.0160	.0317	0.	0.	0.	ATH PN 4,5 IF, OUTR
36	•0336	.0026	0001	0 •	0.	0.	ATM PN 8,1 IF, OUTR
37	-0047	.0027	.0082	0.	0.	8•	ATM PN 2,3 IF, OUTR
38 39	-0055	.0065	.0129	0 •	0.	0.	ATM PN 6,7 IF, INNR
40	0013 -0205	0010 .0023	.0117 .0003	0.	0. 0.	0.	ATM PN 4,5 IF, INNR
41	0002	.0022	.0104	0.	0.	0.	ATM PN 8,1 IF, INNR ATM PN 2,3 IF, INNR
42	0000	.0003	.0102	.0000	0300	.0000	
43	-0000	.0002	-0001	.0000	.0000	-0001	
44	.0011	.0005	.0014	.0001	-0000	.0001	
45	.0006	.0005	0.	0.	8.	0.	ATM SAS ,PN 1
46	.0001	.0000	0.	0.	0.	8.	ATH SAS, PN 3
47	.0000	.0000	0.	0.	0.	0.	ATH SAS, PN 5
48	0000	0000	0.	0.	0.	0.	ATM SAS. PN 7
49	.0165	.0185	.0195	.0058	.8007	0.	SPAR CENTER
50	.0133	.0183	-0169	-0079	.0008		GRAZOAN SENTER
	••••						
SUM	.1490	.3913	-2930	-1076	.0202	•0390	

TABLE C-9

ANALYTICAL MODE 11 ANALYTICAL FREQUENCY = 2.338 HZ.

COMPONENT	GMC	GMC	GMC	GYC	GMC	GMC
NAME	(DX)	(DY)	(DZ)	(TX)	(TY)	(TZ)
BP/OWS SKIRT/IU/FAS	.0037	.0483	.0880	•1354	.0000	.0320
6-FAS 02 TANKS	.6101	.0248	.0251	0.	0.	G.
MDA/STS/AM	.0000	.1250	.0007	.0155	.0001	.0081
5-AM N2 TANKS	.0006	.0078	.0024	0.	0.	0.
COMMAND/SERVICE MOD.	0000	.2101	.0009	.0977	0001	.0119
DEPLOYMENT ASSEMBLY	.0069	.0286	0006	0.	9.	0.
ATM-PACK, CMGS, 4-SAS	.0147	.1049	.0357	.0002	•0000	.0000
ATH-SPAR CENTER	.0001	.0330	.0000	.0065	.0000	0.
ATM-GRA/CAN CENTER	.0000	.0303	.0000	.0193	.0001	.0021
				*		
SUM	.0361	.6128	.0723	.2246	.0001	.0541

TOTA. GM CONTRIBUTION FOR EACH COMPONENT

BR/OWS SKIRT/IU/FAS	. 1973
6-FAS 02 TANKS	.0630
MD4/STS/AM	.1433
6-AM N2 TANKS	.0108
COMMAND/SERVICE MOD.	.3116
DEPLOYMENT ASSEMBLY	.0349
ATM-RACK, CMGS, 4-SAS	.1557
ATH-SPAR CENTER	.0395
AT1-GRA/CAN CENTER	.0419

C-13 TABLE C-10

GENERALIZED HASS CONTRIBUTIONS BY DEGREE OF FREEDOM

ANALYTICAL MODE 11 FREQUENCY= 2.34 4Z.

NODE	GMC	GMC	GM C	GMC	SMC	GMC	NODE
NO.	(XC)	(YO)	(DZ)	(TX)	(TY)	(TZ)	DESCRIPTION
1 2	.0000 .0000	.0363 0000	.0001 0000	.0561 .0180	.0000 0000		BASE RNG/OWS SKIRT OWS/IU INTERFACE
3	.0000	-0000	•0001	.0313	•0000		IU/FAS INTERFACE
4	.0024	3000	.0076	0.	8.	0.	FAS 32 B3TL1,+Y +Z
5	.0008	.0017	.0028	0.	0.	0.	FAS 02 BJTL2,+Y +Z
5	.0007	.0017	.0015	0.	0.	0.	FAS 02 B)TL3,-Y +Z
7	.0023	0000	.0054	0.	0.	0.	FAS 02 BOTL4,-Y +Z
8	.0037	.0080	.0056	0.	0.	0.	FAS 02 BOTL5,-Y -Z
9	.0003	.0134	.0011	0.	0.	0.	FAS 02 BOTL6,-Y -Z
10	.0013	.0013	.0036	0.	0.	0.	FAS/AM/DA IF, +Y
11	.0000	.0011	.0000	0.	0.	0.	FAS/AM/DA IF, +Z
12	.0020	.0019	.0043	0.	0.	0.	FAS/AM/DA IF, -Y
13	.0001	.0012	0002	0 •	0.	0.	FAS/DA IF, -Y -Z
14	.0000	.0055	.0000	0.	0.	0.	FAS/4M IF, -Z
15	.0002	.0007	.0001	0 •	0.	0.	FAS/DA IF, +Y -Z
16	0000	.0011	.0000	.0017	.0030		AM TUNNEL/SHEAR WB
17	.0000	.0126	.0001	.0058	•000C		AM TUNNEL/STS IF
18	.9000	.0406	.0002	.0046			MDA/STS INTERFACE
19	.0000	.0706	.0003	.0033	.0000		MDA CONE/CYL ITRFC
20	.0003	.0004	.0011	0 • 0 •	8.	0.	N2 TANK, +Y, LOWER
21 22	.0903 .0000	.0011	.0012	0.	0 • 0 •	0. 0.	N2 TANK, +Y, UPPER N2 TANK, +Z, LOHER
23	.0000	.0002	.0000	0.	0.	0.	N2 TANK, +Z, UPPER
24	.0000	.0022	.0000	0.	0.	0.	N2 TANK -Z, LOWER
25	.0000	.0040	.0000	0.	0.	0.	NZ TANK, -Z, UPPER
26	.0000	.0612	.0006	.0088	0000		CM, FWD BULKHEAD
27	.0000	.0143	.0035	.0137	.0000		CM, AFT BULKHEAD
28	0000	.0041	0000	.0258	.0000		SM, FHD BULKHEAD
29	0000	.1305	0001	•G394	0001		SM, AFT BULKHEAD
30	.0000	•0299	.0000	0 •	0.	0.	LOWER D LATCH, DA
31	.0034	0010	0003	0.	0.	0.	LOWER +Y TRUNNION
32	.0035	0004	0003	0.	0.	0.	LOWER -Y TRUNNION
33	0000	.0001	.0000	0 •	0 •	0.	EREP PACKAGE C.G.
34	0002	.0120	.0019	0.	0.	0 •	ATM PN 6,7 IF, OUTR
35	.0011	.0115	.0082	0.	0.	0.	ATM PN 4,5 IF, OUTR
35	.0037	.0203	.0099	0.	0.	0.	ATM PN 8,1 IF, OUTR
37	.0018	.0479	.0011	0.	0.	0.	ATM PN 2,3 IF, OUTR
38	.0001	.0002	.0014	0.	0.	0.	ATM PN 6,7 IF, INNR
39 40	.0029	.0001	.0014 .0055	0.	0.	0 • 0 •	ATM PN 4,5 IF, INNR ATM PN 8,1 IF, INNR
41	.0010	.0013	.0055	0.	0. 9.	0.	ATM PN 2,3 IF, INNR
42	.0009	.0008	.0022	.0001	.0000		CMG, -Y SIDE
43	.0006	.0009	.0031	.0001	.0000	.0000	
44	.0000	.0031	.0000	.0001	.0000	.0000	
45	.0001	.0001	0.	0.	0.	0.	ATH SAS , PN 1
45	.0001	.0001	0 •	0 •	0.	0.	ATH SAS, PN 3
47	.0002	.0002	0.	0 •	0.	0.	ATM SAS, PN 5
48	.0001	.0001	0.	0.	0.	0.	ATM SAS, PN 7
49	.0001	.0330	.0000	•0065	.0000	0.	SPAR CENTER
58	.0000	.0303	.0000	.0093	.0001		GRAZCAN DENTER
SUM	0361	.6128	•0723	.2246	.0001	.0541	

TABLE C-11

ANALYTICAL MODE 12 ANALYTICAL FREQUENCY = 3.151 HZ.

COMPONENT	GMC	GMC	GMC	G4C	GHC	640
NAME	(DX)	(YC)	(DZ)	(TX)	(TY)	(TZ)
BRIONS SKIRT/IU/FAS	.0019	.0002	. 8155	.0325	.0104	.0000
5-FAS 02 TANKS	.0027	.0012	.0045	J.	0.	0.
MDA/STS/AM	.0008	.0003	1875	.0381	.0221	0000
5-AM N2 TANKS	.0010	.0001	.0020	0.	G .	0.
COMMAND/SERVICE MOD.	.0027	.0008	• 3629	.0101	.0121	.0002
DEPLOYMENT ASSEMBLY	.0004	.0240	.0137	0.	0 •	0.
ATM-PACK, CMGS, 4-SAS	.0159	.0028	. 2054	.0000	.6981	-0000
ATM-SPAR CENTER	.0007	.0003	.0476	.0002	.0018	0.
ATM-GRA/CAN CENTER	.0005	.0002	• 64 Z û	.0382	.0025	0000
SUM	.0268	.0298	.8811	.0130	.0490	.0003

TOTAL GM CONTRIBUTION FOR EACH COMPONENT

BR/OWS SKIRT/IJ/FAS	.0306
6-FAS 02 TANKS	.0054
MD4/STS/AM	.2109
6-AM NZ TANKS	.0030
COMMAND/SERVICE MOD.	.3888
DEPLOYMENT ASSEMBLY	.0391
ATM-RACK, CMGS, 4-SAS	. 2242
AT4-SPAR CENTER	.0505
AT1-GRA/CAN CENTER	.0455

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C-15 TABLE C-12

12

ANALYTICAL MODE

GENFRALIZED HASS CONTRIBUTIONS BY DEGREE OF FREEDOM

FREQUENCY=

3.15 HZ.

GMC NODE GMC GMC GMC SMC GMC NODE NO. (DX) (DY) (DZ) (TX) (TY) (TZ) DESCRIPTION ..0002 .0000 .0133 .0013 .0000 BASE RNG/OWS SKIRT 1 .0360 2 .0001 -.0000 .0001 .0004 • GO 15 .0000 OWS/IU INTERFACE 3 .0008 .0000 IU/FAS INTERFACE -.0000 .0000 .0001 .0030 .0000 o. FAS 02 BOTL1,+Y +Z 4 .0000 .0000 0. 0. 5 .0004 .0000 .0004 0. 0. 0. FAS 02 BOTL2,+Y +Z 0. 6 .0005 0. 0. FAS D2 B)TL3,-Y +Z .0005 .0014 7 0. .0001 0. FAS 02 BOTL4,-Y +Z .0000 .0011 0. 8 .0002 .0008 0. 0. FAS D2 BOTL5,-Y -Z .0004 0. 9 .0012 0. 0. 0. .0004 .0008 FAS 02 BOTL6,-Y -Z 0. 10 .0031 -.0000 .0000 0. 0. FAS/AM/DA IF, +Y FAS/AM/DA IF, +Z .0001 .0007 .0009 0. 11 0. 0. 12 .0001 -.0000 .0008 0. 0. FAS/AM/DA IF, -Y 0. 0. ũ. FAS/DA IF, -Y -Z 13 .0000 .0000 -.0000 0. .0004 0. 14 .0006 .0000 0. 0. FAS/AM IF, - Z 15 .0000 .0000 -.0000 0. 0. G. FAS/DA IF, +Y -Z .0000 .0000 AM TUNNE_/SHEAR WB .0000 .0009 16 .0002 .0002 17 .0003 .0000 .0078 .0000 .0018 .0000 AM TUNNEL/STS IF 18 .0002 .0001 .0550 -.0000 .0159 .0000 MDA/STS INTERFACE 19 .1246 .0001 .0002 .0002 .0325 -.0000 MDA CONE/CYL ITRFC 0. 20 .0000 .0000 0. N2 TANK, +Y, LOWER .0000 0. 0. 0. 0. 21 .9000 .0000 .0003 N2 TANK, +Y, UPPER 22 .0000 0. 0. .0031 .0002 ũ. N2 TANK, +Z, LOWER 23 0. N2 TANK, +Z, UPPER .0001 .0000 .0007 0. 8. 24 .0004 .0000 .0002 0. 0. 0. N2 TANK -Z, LOWER 25 0. 0. .0003 .0000 .0007 0. N2 TANK, -Z, UPPER .1428 .0008 25 .0006 .0003 .0011 .0000 CM, FWD BULKHEAD -. 0000 CM, AFT BULKHEAD 27 .0008 .0002 .0631 .0015 -.0305 23 .0005 .0000 .0237 .0013 .0028 -.0000 SM, FWD BULKHEAD 29 .0061 .0090 .0002 SM, AFT BULKHEAD .0008 .0003 .1333 30 -.0001 .0003 0. 0. 0. LOWER D LATCH, DA .0123 0. 31 .0004 .0122 .0002 0. Û. LOWER +Y TRUNNION 0. 0. 0. LOWER -Y TRUNNION 32 .0001 .0114 -.0001 .0014 0. 0. 0. 33 .0000 .0000 EREP PACKAGE C.G. 34 .0002 0. ATM PN 6,7 IF, OUTR .0007 .0480 0. 0. ATH PN 4,5 IF, OUTR 35 .0006 .0006 ·0255 €. 0. 0. ATM PN 8,1 IF, OUTR 36 .0003 .0002 .0153 0. 0. 0. 0. 0. 37 .0003 .0001 .0158 0. ATM PN 2,3 IF, OUTR 38 .0012 .0003 .0424 0. 0. Û. ATM PN 6,7 IF, INNR 39 .0019 .0000 .0125 0. G. 0. ATM PN 4,5 IF, INNR 40 .9057 -.0001 .0128 0. 0. ATM PN 8,1 IF, INNR 0. ATM PN 2,3 IF, INNR O. 0. 41 .0025 .0001 .0142 0. -.0000 42 .0007 .0000 .0084 -.0000 .0000 CMG, -Y SIDE CMG, +Y SIDE 43 .0001 .0000 .0008 .0000 .0055 -.0000 CMG, +X SIDE 44 .0000 .0000 .0010 .0000 .0040 .0000 0. ATH SAS , PN 1 45 -.0000 -.0000 0. 0. 0. 0. 0. 0. 46 -.0000 -.0000 0. ATM SAS, PN 3 0. 47 .0004 .0004 0. 0. 0. ATM SAS, PN 5 48 .0005 0. 0. ATM SAS, PN .0005 0. 0. 49 .0003 .0476 .0002 0. .0007 .0018 SPAR CENTER 50 .0005 .0002 .0420 .0002 .0025 -.0000 GRA/CAN SENTER --------

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SUH

.0268

.0298

. 8811

.0130

.0490

TABLE C-13

ANALYTICAL MODE 13 ANALYTICAL FREQUENCY = 3.532 HZ.

COMPONENT	GMC	GMC	GMC	G4C	GMC	GMC
NAME	(DX)	(DY)	(DZ)	(TX)	(TY)	(TZ)
BP/OWS SKIRT/IU/F4S	.0001	.0064	.0066	.0802	.0003	.0001
B-FAS 02 TANKS	.0000	.0261	.0248	0.	0.	D •
MDA/STS/AM	.0000	.0005	.0048	.0317	.0003	.0001
5-AM N2 TANKS	.0000	.0014	.0012	0.	0.	0.
COMMAND/SERVICE MOD.	.0001	.0031	.0072	.8714	• 0 0 05	.0080
DEPLOYMENT ASSEMBLY	0001	.0058	.0010	0.	0.	0.
ATM-PACK, CMGS, 4-SIS	.0032	.0073	.0091	.0300	.0000	.0000
ATM-SPAR CENTER	.0000	.0007	.0004	.0314	.0001	0.
ATM-GRA/CAN CENTER	• 0 0 0 0	.0007	.0003	.0019	.0002	.0008
SUM	.0034	.0521	. 0555	.8366	.0014	.0010

TOTAL GM CONTRIBUTION FOR EACH COMPONENT

BRYOWS SKIRT/IU/FAS	. 1937
6-FAS 02 TANKS	.0519
MD4/STS/AM	.0075
6-AM N2 TANKS	.0027
CO4MAND/SERVICE MOD.	.8123
DEPLOYMENT ASSEMBLY	.0057
ATM-RACK, CMGS, 4-SAS	.0137
AT1-SPAR CENTER	.0026
AT4-GRA/CAN CENTER	.0040

C-17 TABLE C-14

GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

ANALYTICAL MODE 13 FREQUENCY= 3.53 HZ.

NODE	GMC	GMC	GMC	GMC	SMC	GHC	NODE
NO.	(xa)	(DY)	(DZ)	(TX)	(TY)	(TZ)	DESCRIPTION
1	.0000	.0002	.0001	• G 420	.0002		BASE RNG/OWS SKIRT
2	.0000	.0001	0000	.0139	.0000		OWS/IU INTERFACE
	.0080	.1003	.0001	.0243	.0001		IU/FAS INTERFACE
4 5	0000	.0022	.0083	0.	ũ•	0.	FAS 02 BOTL1,+Y +Z
5	0000	.0068	.0034	0.	0.	0.	FAS 02 BOTL2,+Y +Z
7	.0000	.0063	.0014	0.	0.	8.	FAS 02 BOTL3,-Y +Z
	.7000	.0021	.0052	0.	0.	0.	FAS 02 BOTL4,-Y +Z
8	.0000	.0023	.0052	0.	0.	0.	FAS 02 BOTL5,-Y -Z
9	.0000	.0064	.0013	0 •	0.	0.	FAS 02 BOTL5,-Y -Z
10	.0001	0000	.0030	0.	8.	8.	FAS/AM/DA IF, +Y
11	.9000	.0841	.0001	0.	0.	0.	FAS/AM/DA IF, +Z
12	.0000	0000	.0031	0.	0.	0.	FAS/AM/DA IF, -Y
13	.0000	.0001	.0001	0.	8.	0.	FAS/DA IF, -Y -Z
14	.0000	.0018	.0001	0.	0.	0.	FAS/AM IF, -Z
15	.0000	.0001	.0002	0.	0.	0.	FAS/DA IF, +Y -Z
15	.0000	.0000	.0001	.0001	.0000		AM TUNNE_/SHEAR HB
17	• 0000	.0000	.0004	.0001	.0000		AM TUNNEL/STS IF
18	.0000	.0001	.0017	.0006	.0003		MDA/STS INTERFACE
19	.0000	.0004	.0027	.0008	.0000		MDA CONE/CYL ITRFC
20	.0000	.000C	.0007	0.	a.	0.	N2 TANK, FY, LOHER
21	•3000	.0000	.0004	0.	0.	8 •	N2 TANK, +Y, UPPER
22	.0000	.0005	.0000	0.	0.	0.	N2 "ANK, +Z, LOWER
23	.0000	.0002	.0000	0.	0.	0.	NZ TANK, +Z, UPPER
24	.0000	.0006	.0000	0.	0.	0.	N2 TANK -Z, LOWER
25	• 0000	.0002	.0000	0.	0.	0.	N2 TANK, -Z, UPPER
26	.0000	.0011	.0013	.0749	.0001		CM, FHD BULKHEAD
27	.0000	.0007	0001	-1144	0000	.0000	
28	.0000	0000	0005	•2463	.0001	-0000	
29	.0000	.0013	.0065	•3658	.0004		SM, AFT BULKHEAD
30	0000	.0031	.0002	0.	9.	0.	LOWER D _ATC+, DA
31	0001	.0002	.0005	0 •	0.	0.	LOWER +Y TRUNNION
32	0000	.0002	.0002	0.	0.	0.	LOWER -Y TRUNNION
33	0000	.0023	.0001	0.	0.	0.	EREP PACKAGE C.G.
34	0000	•0000	.0015	0 •	0.	0.	ATM PN 6,7 IF, OUTR
35	.0005	.0002	.0006	0.	0.	0 •	ATM PN 4,5 IF, OUTR
36	.0006	.0009	.0023	0.	0.	0.	ATH PN 8,1 IF, OUTR
37	.0003	.0028	.0031	0.	0.	0.	ATM PN 2,3 IF, OUTR
38	3000	.0026	.0014	0 •	0.	9 •	ATH PN 6,7 IF, INNR
39	.0013	.0007	.0002	0.	B •	0.	ATM PN 4,5 IF, INNR
40	.0000	.0001	.0017	0.	0.	0.	ATM PN 8,1 IF, INNR
41	.0001	.0000	.0001	0.	0.	0.	ATM PN 2,3 IF, INNR
42	.0003	.0001	.0002	.0000	.0000		CMG, -Y SIDE
43	.0001	.0000	.0010	.0000	.0000	.0000	
44	.0000	.0000	•0000	.0000	•0000	.0000	
4.5	0000	0000	0.	0.	0.	0.	ATM SAS , PN 1
46	.0000	.0000	0.	0.	0.	0.	ATH SAS, PN 3
47	.0000	.0000	0 •	0.	0•	0•	ATH SAS, PN 5
48	.0000	.0000	0.	0.	0.	8.	ATH SAS, PN 7
49	.0000	.0007	.0004	.0014	.0001	0.	SPAR CENTER
50	.0000	.0007	.0003	.0019	.0002		GRAZCAN SENTER
SUM	.0034	.0521	.0555	-8866	.0014	0.010	
3011	• • • • •	• U Z I	● U フフフ	• 0000	• nn T #	.0010	

TABLE C-15

ANALYTICAL MODE 14 ANALYTICAL FREQUENCY = 4.323 HZ.

COMPONENT	GMC	GMC	GMC	G4C	GMC	640
NAME	(DX)	(PY)	(DZ)	(LX)	(TY)	(TZ)
BR/OWS SKIRT/IU/FAS	.0004	.0133	.0018	.0177	.0006	.0052
5-FAS 02 TANKS	.0014	.0051	.0049	0.	0.	0.
MDA/STS/AM	.0001	.0419	.0000	.0304	0000	.0055
5-AM N2 TANKS	.0000	.0007	.0003	0.	0.	0.
COMMAND/SERVICE 400.	.0000	.1180	.0000	.0342	6000	.0047
DEPLOYMENT ASSEMBLY	.0015	.0058	.0031	0.	0.	0.
ATM-RACK, CMGS, 4-54S	.1007	.3191	.1737	.0311	0000	.0004
ATM-SPAR CENTER	. 000 0	.0007	0000	.0437	0000	0.
ATM-GRA/CAN CENTER	.0000	.0002	0000	•0554	.0003	.0586
			*			
SUM	.1041	.5049	. 1839	.1224	.0003	.0845

TOTAL GH CONTRIBUTION FOR EACH COMPONENT

BR/OWS SKIRT/IU/FAS	. 1383
6-FAS 02 TANKS	.0114
MD4/STS/AM	• 0 4 3 0
6-AM N2 TANKS	.0011
COMMAND/SERVICE MOD.	.1270
DEPLOYMENT ASSEMBLY	.0133
ATY-RACK, CMGS, 4-SAS	•59+9
ATM-SPAR CENTER	.04+5
ATY-GRA/CAN CENTER	. 1245

C-19 TABLE C-16

GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

ANALYTICAL MODE 14 FREQUENCY= 4.32 4Z.

NODE	GMC (DX)	GMC	GMC (DZ)	GMC (TX)	SMC (TY)	GMC (TZ)	NODE Description
150							
1	.0900	.0112	.0000	.0094	0000		BASE RNG/OWS SKIRT
2	.0000	.0005	0000	.0031	.0000		OWS/IU INTERFACE IU/FAS INTERFACE
3	.0000	.0001	.0000	.0052	.0000	0.	FAS 02 BUTL1,+Y +Z
4 5	.0007	.0005 .0020	.0012 .0005	0.	υ• Θ•	0.	FAS 02 BJTL2,+Y +Z
6	.0001 0000	.0019	.0003	0.	0.	0.	FAS 02 BOTL3,-Y +Z
7	.0000	.0004	.0009	0.	0.	0.	FAS 02 BOTL4,-Y +Z
8	.0003	.0003	.0020	0.	0.	0.	FAS 02 80TL5,-Y -Z
9	•0000	.0000	.0001	0.	0.	8.	FAS 02 BOTL6,-Y -Z
16	.0001	•0000	.0005	0.	0.	0.	FAS/AM/DA IF, +Y
11	.0000	.0012	.0000	0.	0.	0.	FAS/AM/DA IF, +Z
12	.0002	.0000	.000 8	0 •	0.	0.	FAS/4M/04 IF, -Y
13	0000	.0001	.0004	0.	0.	0.	FAS/DA IF, -Y -Z
14	.0000	.0002	.0000	0 •	0.	G •	FAS/AM IF, -Z
15	.0000	0000	.0000	0.	0.	0.	FAS/DA IF, +Y -Z
15	.0000	•0000	.0000	.0062	0000		AM TUNNEL/SHEAR NB
17	.0000	.0001	0 0 0 0	.0004	•000G		AM TUNNEL/STS IF
18	.0000	.0085	0 00 0	.0000	3000		MDA/STS INTERFACE
19	.0000	.0333	0000	0001	3000		MDA CONE/CYL ITRFC
20	.0000	.0000	.0002	0.	0.	0.	N2 TANK, +Y, LOWER
21	.0000	.0000 .0003	.0002	0 • 0 •	0. 0.	0 • 0 •	N2 TANK, +Y, UPPER N2 TANK, +Z, LOWER
22 23	.0000	.0002	.0000	0.	0.	0.	N2 TANK, +Z, UPPER
23 24	.0000	.0001	.0000	0.	0.	0.	N2 TANK -Z, LOWER
25	.0000	.0001	.0000	0.	0.	0.	NZ TANK, -Z, UPPER
26	.0000	.0484	0000	.005	0000		CM, FWD BULKHEAD
27	.0000	.0287	.0000	.0008	.0000	0003	
28	0000	.0118	0000	.0011	.0000	.0010	
29	0000	.0291	.0000	.0018	0000	.0038	SM, AFT BULKHEAD
30	.0000	.085 0	.0000	0 •	6.	0.	LOWER D LATCH, DA
31	.0008	.0003	.0016	0 •	0.	0.	LOWER +Y TRUNNION
32	.0006	0000	.0015	0.	0.	G •	LOWER -Y TRUNNION
33	.0000	.0006	.0000	0 •	0 •	0.	EREP PACKAGE C.G.
34	.0003	.0147	-0025	0 •	0.	0.	ATH PN 6,7 IF, OUTR
35	.0180	.0003	.0435	0.	0.	0.	ATM PN 4,5 IF, OUTR
36	.0186	.0035	.0342	0.	0.	0.	ATM PN 8,1 IF, OUTR ATM PN 2,3 IF, OUTR
37 38	.0062 .0127	.0226 .1814	.0845 .0845	0 • 0 •	0. 0.	0 • 0 •	ATM PN 6,7 IF, INNR
39	.0166	0354	.0187	0.	0.	0.	ATM PN 4,5 IF, INNR
40	.0113	.0076	.0308	0.	0.	0.	ATM PN 8,1 IF, INNR
41	0015	.0249	.0049	0.	0.	0.	ATM PN 2,3 IF, INNR
42	.0043	.0101	.0151	.0002	0000	.0001	
43	.0072	.0100	.0148	.0086	0000	.0002	
44	.0801	.0017	.0001	.0003	000c	.0002	CMG, +X SIDE
45	.0019	.0019	0.	0.	0.	8.	ATH SAS , PN 1
46	.0016	.0016	0.	0.	0.	0.	ATH SAS, PN 3
47	.0019	.0019	0 •	0.	g.	0.	ATH SAS, PN 5
48	.0014	.0014	0.	0.	0.	0.	ATM SAS, PN 7
49	.0000	.0007	0000	•0437	0000	0.	SPAR CENTER
50	.0000	.0002	0000	.0554	.0003	. 4000	GRA/CAN CENTER
SUM	.1041	• 50 49	. 1839	. 1224	.0033	0845	
3011	• T A 4 T	• .	# TO 0 9		-000	# D 0 4 9	

TABLE C-17

ANALYTICAL MODE 15 ANALYTICAL FREQUENCY = 4.868 HZ.

COMPONENT	GMC	GMC	GMC	G4C	GMC	GMC
NAME	(XQ)	(DY)	(DZ)	(X1)	(TY)	(TZ)
BP/OWS SKIRT/IU/FAS	.0027	.0004	.0069	.0000	.0056	.0002
5-FAS OZ TANKS	.0027	.0005	.0041	0.	0.	0.
MPA/STS/AH	.0030	.0004	.0113	.0000	.0034	.0001
6-AM N2 TANKS	.0005	.0000	.0007	0.	0.	0.
COMMAND/SERVICE MOD.	.0066	.0012	.0451	.0381	.0010	.0001
DEPLOYMENT ASSEMBLY	.0012	.0181	.0328	0.	0.	0.
ATM-RACK, CMGS, 4-SAS	. 3376	.0134	• 3322	.0000	.0022	6000
ATM-SPAR CENTER	.0008	.0000	.0002	0100	.0674	3.
ATM-GRAZCAN CENTER	.0012	.0000	.0002	0000	.0958	.0001
SUM	.3563	.0341	• 4335	.0001	.1755	.0004

TOTA_ GM CONTRIBUTION FOR EACH COMPONENT

BR/OWS SKIRT/IU/FAS	. 3158
6-FAS 02 TANKS	.0072
MDA/STS/AM	.0181
6-AM N2 TANKS	.0013
COMMAND/SERVICE MOD.	. 15+2
DEPLOYMENT ASSEMBLY	.0522
ATH-RACK.CMGS.4-SAS	.6855
AT1-SPAR CENTER	.0634
ATM-GRA/CAN CENTER	.0973

TABLE C-18

GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

ANALYTICAL MODE 15 FREQUENCY= 4.87 HZ.

NODE	GMC	GHC	GMC	GMC	SMC	GMC	NODE
NO.	(DX)	(DY)	(DZ)	. (TX)	(TY)	(TZ)	DESCRIPTION
1	.0010	.0002	.0052	.0000	.0332		BASE RNG/ONS SKIRT
2	.0004	.0000	0000	.0000	.0007		OWS/IU INTERFACE
3	.0004	.0000	.0002	•0000	.0017		IU/FAS INTERFACE
4	.0000	.0000	.0009	0.	0 •	0 •	FAS 02 BOTL1,+Y +Z
5	.0031	.0001	.0005	0.	0.	0.	FAS 02 BOTL2,+Y +Z
6	.0000	.0000	.0007	0.	0.	0.	FAS 02 BOTL3,-Y +Z
7	.0032	.0000	.0011	0.	0.	0.	FAS .02 BJTL4,-Y +Z
8	.0007	.0000	.0007	0.	0.	0.	FAS 02 BOTL5,-Y -Z
9	.0017	.0003	• 0 00 S	0 •	0.	0.	FAS 02 BOTL6,-Y -Z
10	.0001	0000	.0003	0.	0.	0.	FAS/AM/DA IF, +Y
11	.0002	.0000	.0003	0 •	0.	0 •	FAS/AM/DA IF, +Z
12	.0003	.0000	.0006	0 •	0.	0.	FAS/AM/DA IF, -Y
13	.0000	.0001	.0002	0 •	0.	0.	FAS/DA IF, -Y -Z
14	.0004	•0000	.0001	0.	0.	C •	FAS/AM IF, -Z
15	.0001	.0000	.0000	0.	0.	0.	FAS/DA IF, +Y -Z
15	.0004	.0000	.0006	0000	0000		AM TUNNE_/SHEAR HB
17	.0006	.0000	•0009	.0000	.0034		AM TUNNEL/STS IF
18	.0010	.0000		•0000	.0321		MDA/STS INTERFACE
19	.0010	.0003	.0093	.0000	.0009	.0000	
20	.0001	.0000	.0002	0.	0.	0.	N2 TANK, +Y, LOHER
21	.0001	.0000	.0002	0 •	0.	0.	N2 TANK, TY, UPPER
22	.0000	.0000	.0001	0.	0.	0.	N2 TANK, +Z, LOWER
23	• 0 0 0 0	.0000	.0001	0.	0.	0.	NE TANK, +Z, UPPER
24	.0002	.0000	.0001	0.	0.	G •	N2 TANK -Z, LOWER
25	.0032	.0000	.0001	0.	0. 0000	0.	N2 TANK, -Z, UPPER
26 27	.0011	•0005	.0175	.0000	0301		CM, FWD BULKHEAD CM, AFT BULKHEAD
	.0015	.0003	.0123	.0000			
28 29	.0017 .0022	.0002 .0003	.0047 .0106	.8001 0000	•0004 •0008	.0000	SM, FWD BULKHEAD SM, AFT BULKHEAD
30	.0011	.0003	.0196	0.	8.	0.	LOWER D LATCH, DA
31	0000	•0083	•0039	0.	0.	0.	LOWER +Y TRUNNION
32	.0001	.0097	.0049	0.	0.	0.	LOWER -Y TRUNNION
33 33	.0000	.0000	.0043	0.	8.	0.	EREP PACKAGE C.G.
34	.0019	.0007	.0695	0.	0.	0.	ATH PN 6,7 IF, OUTR
35 35	.0007	.0001	.0051	0.	0.	0.	ATM PN 4,5 IF, OUTR
36	.0056	.0003	.0117	0.	0.	0.	ATM PN 8,1 IF OUTR
37	.0051	0003	.0856	0.	0.	0.	ATH PN 2,3 IF, OUTR
38	0324	0028	.0507	0.	0.	0.	ATH PN 6,7 IF, INNR
39	. 2795	0012	.0008	0.	0.	0.	ATH PN 4,5 IF, INNR
40	1934	.0058	.0114	0.	ů.	0.	ATM PN 8,1 IF, INNR
41	.0672	.0004	.0714	0.	0.	0.	ATH PN 2,3 IF, INNR
42	.0147	.0001	0000	.0000			CMG, -Y SIDE
43	.0122	.0002	.0001	.0000			CMG, +Y SIDE
44	.0146	.0001	.0250	.0000	.0008	0000	
45	.0023	.0023	0.	0 •.	0.	0.	ATM SAS , PN 1
46	.0026	.0026	0.	0.	0.	0.	ATM SAS, PN 3
47	.0021	.0021	0 •	0.	0.	0.	ATM SAS, PN 5
48	.0023	.0023	0.	0.	0.	0.	ATM SAS, PN 7
49	.0008	.0000	.0002	0000	.0574	0.	SPAR CENTER
50	.0012	.0000	.0002	0000	.0958		GRAZCAN SENTER
							•
SUM	• 3563	.0341	• 4335	.0001	•1755	.0004	

TABLE C-19

ORBITAL CONFIGURATION MODAL SURVEY ANALYTICAL MODES GENERALIZED MASS CONTRIBUTION SUMMARY

ANALYTICAL MODE 18 ANALYTICAL FREQUENCY = 5.706 HZ.

COMPONENT	GMC	GMC	GMC	G4C	GMC	640
NAME	(DX)	(DY)	(DZ)	(TX)	(TY)	(TZ)
BR/OWS SKIRT/IU/FAS	.0099	. 1988	.0002	.0335	.0001	.0595
5-FAS 02 TANKS	.0203	.0601	.0023	0.	0.	0.
MDA/STS/AM	.0003	.0587	• 00 0 B	.0014	0000	.0120
5-AM N2 TANKS	.0004	.0176	.0001	0.	0.	0.
COMMAND/SERVICE 400.	.0002	.2062	.0002	.0028	.0001	.0071
DEPLOYMENT ASSEMBLY	.0117	.0820	.0002	0.	0 •	0.
ATM-RACK, CMGS, 4-54S	.0497	.0443	0000	.0000	0000	.0002
ATM-SPAR CENTER	.0006	.0003	0000	.0300	.0001	0.
ATM-GRAZCAN CENTER	.0005	.0804	0000	.0009	.0001	.2392
SUM	.0934	.5683	.0030	.0369	.0003	.3281

BR/OWS SKIRT/IU/FAS	.1821
6-FAS 02 TANKS	.0824
MD4/STS/AM	.0724
6-AM N2 TANKS	.0131
COMMAND/SERVICE MOD.	. 2158
DEPLOYMENT ASSEMBLY	.1939
ATM-RACK, CMGS, 4-SAS	.0942
AT4-SPAR CENTER	.0009
ATM-GRAZCAN CENTER	. 2402

C-23 TABLE C-20

GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

ANALYTICAL MODE 18 FREQUENCY= 5.71 HZ.

NODE	GMC	GMC	GM C	GMC	SMC	GMC	NODE
NO.	(DX)	(DY)	(DZ)	(TX)	(TY)	(TZ)	DESCRIPTION
1	.0001	.0768	.0003	.0020	.0001		BASE RNG/OWS SKIRT
2	0003	0000	.0000	.0006	.0000		OWS/IU INTERFACE
3	0000	.0025	0000	.0009	.0000	.0203	IU/FAS INTERFACE
4	.0060	.0078	.0001	0 •	0.	0.	FAS 02 B)TL1,+Y +Z
5	.0014	.0084	.0000	6 •	0.	G.	FAS 02 BOTL2,+Y +Z
5	.0012	.0076	.0000	0.	0.	0.	FAS 02 BOTL3, -Y +Z
7	0054	.0073	.0031	0.	0.	0.	FAS 32 BOTL4,-Y +Z
8	.0048	0124	.0014	0.	0.	0.	FAS 02 BOTL5,-Y -Z
9	.0013	.0166	.0008	0 •	0.	0.	FAS D2 BOTL6,-Y -Z
10	.0043	.0036	.0000	0 •	0.	0.	FAS/AM/DA IF, +Y
11	.0000	.0044	.0000	0.	0.	0.	FAS/AM/DA IF, +Z
12	.0049	.0053	.0000	0.	0.	0.	FAS/AM/DA IF, -Y
13	.0001	.0022	0001	0.	0.		FAS/DA IF, -Y -Z
14	.0000	.C030	0000	0.	ā. ·	0.	FAS/AH IF, -Z
15	.0005	.0009	0000	0.	0.	ø.	FAS/DA IF, +Y -Z
16	.0000	.0118	.0000	.0001	.0000		AM TUNNE SHEAR HB
17	.0001	.0203	.0000	.0002	.0000		AM TUNNEL/STS IF
16	.0001	0014	.0000	.0004	0000		MDA/STS INTERFACE
	•0001	.0279	0000	.0006	0000		MDA CONE/CYL ITRFC
19	.0002	.0022	.0000	0.	0.	0.	N2 TANK, +Y, LOWER
20			.0000	0.	0.	G.	N2 TANK, +Y, UPPER
21	.0003	.0025		0.	0.	0 • 0 •	N2 TANK, +Z, LOWER
22	.0000	.0028	.0000	0.	0.	υ·	N2 TANK, +Z, UPPER
23	.0000	.0030	.0000	0.	0.	0.	N2 TANK -Z, LOWER
24	.0000	.0032	.0000	0.	0.	0.	N2 TANK, -Z, UPPER
25	.0000	.0039 .0768	.0000	0001	3080		CM, FWD BULKHEAD
25 27	.0001 .0001		.0001	0002	.0600	0004	
27	0001	.0639 .0234	.0000		0000		SM, FWD BULKHEAD
28				.0009	.0001		SH, AFT BULKHEAD
29	0000	.0421	.0000 .0000	0.	0.	0.	LOWER D LATCH, DA
30	.8998	.0352		0.	0.	0.	LOWER +Y TRUNNION
31	.0053	.0037		0.	0.	0.	LOWER -Y TRUNNION
32	.0054	.0029	.0000 .0002		-		EREP PACKAGE C.G.
33	.0000	.0402	.0002	0.	9.	0.	
34	.0008	.9078	.0000	0.		0 •	ATM PN 6,7 IF, OUTR
35	.0101	.0006	0001	0.	0.	0.	ATM PN 4,5 IF, OUTR ATM PN 8,1 IF, OUTR
36	.0089	.0012		0.	0.	0.	
37	.0029	.0108	.0000	0.	0.	0.	ATM PN 2,3 IF, OUTR
38	.0010	.0104	0000		0.	0.	ATM PN 6,7 IF, INNR ATM PN 4,5 IF, INNR
39	.8090	.0007	0000	0.	0.	0.	
40	.3086		.0000			0 •	ATH PN 8,1 IF, INNR
41	.0024	.0086	0000	0.	0.	0.	ATH PN 2,3 IF, INNR
42	.0032	0000	.0000	.0000	0000		CMG, -Y SIDE
43	.0028	.0000	0000	6000	0000		CMG, +Y SIDE
44	.0000	.0026	.0000	0000	0000	.0001	
45	.0000	.0000	0.	0.	0.	0.	ATH SAS ,PN 1
46	.0000	.0000	0.	0.	0.	0.	ATH SAS, PN 3
47	.0000	.0000	0.	0.	0.	0.	ATM SAS, PN 5
48	.0000	•0000	9.	0.	0.	0.	ATM SAS, PN 7
49	.0006	.0003	0000	.0000	.0001	2702	SPAR CENTER
50	.0005	.0004	0000	.0000	.0001	. 2392	GRA/CAN DENTER
C 114	00.7/	E6 0 7		0060			
SJM	• 1934	•5583	• 00 30	.0069	.0003	.3281	

TABLE C-21

ORBITAL CONFIGURATION MODAL SURVEY ANALYTICAL 10DES GENERALIZED HASS CONTRIBUTION SUMMARY

ANALYTICAL MODE 21 ANALYTICAL FREQUENCY = 6.552 HZ.

COMPONENT	GMC	GMC	GMC	GYC	GMC	GYC
NAME	(DX)	(PY)	(DZ)	(TX)	(TY)	(TZ)
AP/OWS SKIRT/IU/FAS	.0081	.0005	.1849	.0016	.1203	.0000
5-FAS 02 TANKS	.0370	.0156	.1307	0.	0.	3.
MDA/STS/AM	.0004	.0003	10 37	.0007	.0130	.0001
6-AM N2 TANKS	.0011	.0003	. 0457	0.	g .	0.
COMMAND/SERVICE HOD.	.0004	.0002	. 1644	0000	.0036	0000
DEPLOYMENT ASSEMBLY	.0172	.0184	.0416	0.	0.	0 •
ATM-RACK .CMGS .4-SAS	.0195	.0029	.0451	.0080	.0001	-0300
ATM-SPAR CENTER	.0007	6000	.0061	.0300	.0035	0 •
ATM-GRA/CAN CENTER	.0008	.0000	.3053	0000	.0050	.0000
SUM	.0852	.0383	.7285	.0923	• 1456	.0001

BR/OWS SKIRT/IJ/FAS	3156
6-FAS 02 TANKS	.1833
MD4/STS/AM	.1131
6-4M N2 TANKS	.0471
COMMAND/SERVICE MOD.	.1686
DEPLOYMENT ASSEMBLY	.0772
AT4-RACK, CMGS, 4-SAS	.0636
AT1-SPAR CENTER	.0103
ATM-GRA/CAN CENTER	.0111

C-25 TABLE C-22

GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

ANALYTICAL MODE 21 FREQUENCY= 6.55 4Z.

NODE	GMC	GMC	GMC	GMC	3 M C	GMC	ноэе
NO.	(XC)	(DY)	(DZ)	(TX)	(TY)	(TZ)	DESCRIPTION
-							
1	• 3 9 9 0	.0000	.1533		.0711		BASE RNG/OWS SKIRT
2	0000	.0001	•0002	•0063	.0150		OHS/IU INTERFACE
3	• 0 0 0 0	.0001	.0030	.0004	.0342		IU/FAS INTERFACE
4	.0045	.0013	.0271	0.	0.	0.	FAS 02 BOTL1,+Y +Z
5	•0077	•0043	.0257	0.	8.	0.	FAS 02 BOTL2,+Y +Z
5 7	.0078	•0051	.0227	0.	0.	0.	FAS 02 BOTL3,-Y +Z
8	.0043	.0019	.0178	0 • D •	0. 0.	0.	FAS 02 BOTL4,-Y +Z
9	.0053 .0074	.0008 .0021	.0156 .0208	0.	0.	0. 0.	FAS 02 B)TL5,-Y -Z FAS 02 B)TL6,-Y -Z
10	.0001	0000	.0056	0.	0.	0.	FAS/AM/DA IF, +Y
11	•0040	0000	.0099	8.	0.	0.	FAS/AM/DA IF, +Z
12	.0002	.0001	.0050	0.	0.	0.	FAS/AM/DA IF, -Y
13	.0002	0000	.0809	0.	0.	9.	FAS/DA [F, -Y -Z
14	.0033	.0004	.0062	0.	0.	0.	FAS/AM IF, -Z
15	.0004	0000	.0008	0.	0.	0.	FAS/DA IF, +Y -Z
15	•0000	.0001	.0298	.0001	.0001		AM TUNNE / SHEAR WB
17	.0.000	.0001	.0530	.0002	.0037		AM TUNNE_/STS IF
18	.0001	.0000	.0139	.0002	.0030	.0000	MDA/STS INTERFACE
19	.0002	.0001	.0071	.0003	.0061	.0000	MDA CONE/CYL ITRFC
23	.0000	.0000	.0081	0.	0.	Ū •	N2 TANK, +Y, LOWER
21	.0000	.0000	.0096	0.	0.	0.	N2 TANK, +Y, UPPER
22	.0001	.0000	.0059	0.	0.	0.	N2 TANK, +Z, LOWER
23	.0002	.0000	.0079	0.	0.	0 •	NZ TANK, +Z, UPPER
24	.0004	.0001	.0060	0.	0.	0.	N2 TANK -Z, LOWER
25	.0004	.0001	.0073	0.	0.	0.	N2 TANK, -7, UPPER
25	.0001	.0001	.0529	0000	.0000		CM, FHD BULKHEAD
27	.0001	.0000	.0608	0000	0001	• 0000	CM, AFT BULKHEAD
28	.0001	.0000	.0179	.0001 0001	.031G	- 0000	SM, FHO BULKHEAD SM, AFT BULKHEAD
29 30	.0001 .0002	.0000 .0000	.0327 .0005	0.	.0328	0.	LOWER D LATCH, DA
31	.0002	.0084	.0090	0.	0.	0.	LOWER +Y TRUNNION
32	.0004	.0077	.0088	0.	0.	0.	LOWER -Y TRUNNION
33	-0166	.0023	0234	0.	0.	0.	EREP PACKAGE C.G.
34	.0005	.0000	0000	0.	0.	0.	ATH PN 6,7 IF, OUTR
35	.0007	0000	.0005	0.	8.	0.	ATH PN 4,5 IF, OUTR
36	.0011	.0001	.0047	O.	0.	0.	ATM PN 8,1 IF, OUTR
37	.0012	0001	.0167	0.	0.	0.	ATH PN 2,3 IF, OUTR
38	.0009	.0000	0800	C .	0.	0.	ATH PN 6,7 IF, INNR
39	.0038	0002	-0004	0.	0.	0.	ATM PN 4,5 IF, INNR
40	.0037	.0013	.0039	0.	0.	0.	ATM PN 8,1 IF, INNR
41	.0041	0001	-0141	0.	0.	0 •	
42	-0005	.0001	.0008	.0000	.0000		CMG, -Y SIDE
43	.0005	.0001	.0804	.0000			CMG, +Y SIDE
44	.0008	0000	.0047	.0000	.0001	•0000	•
45	.0007	-9087	0.	0.	0.	0.	ATH SAS ,PN 1
45 47	.0009	.0009	0.	0.	0.	0.	ATM SAS, PN 3
48	.0000	.0000	0.	0.	0 • G •	0 • 0 •	ATM SAS, PN 5 ATM SAS, PN 7
49	.0007	0000	.0051	.0000	.0035	0.	SPAR CENTER
50	.0008	.0000	.0053	0000	.0050		GRAZCAN SENTER
-							CHAPTER CERTER
SUM	.0852	.0383	.7285	.0023	.1456	.6001	

TABLE C-23

ORBITAL CONFIGURATION MODAL SURVEY ANALYTICAL 10DES GENERALIZED MASS CONTRIBUTION SUMMARY

ANALYTICAL MODE 28 ANALYTICAL FREQUENCY = 9.192 HZ.

COMPONENT	GMC	GMC	GMC	GYC	GMC	GMC
NAME	(DX)	(DY)	(DZ)	(TX)	(TY)	(TZ)
BRIONS SKIRT/IU/FAS	.0004	.0089	.0138	.0304	.0055	.0015
5-FAS 02 TANKS	.0178	• 4652	• 444D	0.	0.	0.
MDA/STS/AM	.0000	.0044	.0073	.0009	.0004	.0002
6-AM N2 TANKS	.0818	.0016	.0075	0.	0.	0.
COMMAND/SERVICE MOD.	.0002	.0000	.0000	.0001	.0000	.0000
DEPLOYMENT ASSEMBLY	.0013	.0059	• 00 35	0.	0.	0.
ATM-PACK, CMGS, 4-SAS	.0031	.0024	.0013	.0000	.0000	.0000
ATM-SPAR CENTER	.0000	.0001	.0001	.0102	.0001	0.
ATM-GRA/CAN CENTER	.0000	.0001	.0001	.0002	.0001	.0000
SUM	.0237	.4885	•4779	.0119	.0061	.0019

BR/OWS SKIRT/IJ/FAS	.0316
6-FAS 02 TANKS	.9270
MD3/STS/AM	.0133
6-AM N2 TANKS	.0132
COMMAND/SERVICE MOD.	.0003
DEPLOYMENT ASSEMBLY	.01)8
ATM-RACK, CMGS, +-SAS	.0058
AT1-SPAR CENTER	.0005
ATM-GRA/CAN CENTER	.0015

C-27 TABLE C-24

GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

ANALYTICAL MODE 28

FREQUENCY= 9.19 HZ.

NODE	GMC	GMC	GMC	GMC	SMC	GMC	NODE
NO.	(XC)	(PY)	(DZ)	(TX)	(TY)	(TZ)	DESCRIPTION
1	.0000	.0001	.0004	.0003 .0000	.0323		BASE RNG/OWS SKIRT
2	.0000	.0005	.0007		.0002		OWS/IU INTERFACE
3	.0030	.0022	.0039	.0001	.0329		IU/FAS INTERFACE
4	.0053	.0004	.0007	0 •	0.	0.	FAS 02 BOTL1,+Y +Z
5	.0056	.0521	.0235	0.	0.	0.	FAS 02 BJTL2,+Y +Z
5	.0004	.3625	.0393	0.	0.	0.	FAS 02 BOTL3,-Y +Z
7 B	.0007	.0431	•3756	0.	0.	0.	FAS 02 BOTL4, -Y +Z
	.0022	.0066	.0046	0.	0.	0.	FAS 32 B3TL5,-Y -Z
9	.0036	.0004 0000	.0003 .0024	0.	0.	0.	FAS 32 B3TL5, -Y -Z
10	.0004 0002	.0020	.0024	0 • 0 •	0. G.	0. G.	FAS/AM/DA IF, +Y FAS/AM/DA IF, +Z
11						0.	FAS/AM/D4 IF, +2
12	0002	.0031	•0015 ••0000	0.	0. 0.	0.	FAS/DA IF, -Y -Z
13 14	.0000 .0003	.0002 .0006	.0000	0.	0.	0.	FAS/4M IF, -Z
15	.0003	.0003	.0004	0.	8.	0.	FAS/DA IF, +Y -Z
		.0023	•0041	.0000	.0003		AM TUNNE./SHEAR WB
15 17	.0000 .0000	.0011	.0015	.0003	•0003		AM TUNNEL/STS IF
18	.0000	.0011	.0015	.0003	0001		MDA/STS INTERFACE
19	.0000	.0081	.0001	.0003	.0001		MDA CONE/CYL ITREC
20	.0001	.0009	•0000	0.	0.	0.	N2 TANK, +Y, LOWER
21	.0001	.0004	.0000	0.	0.	0.	N2 TANK, +Y, UPPER
22	•0002	.0000	.0039	0.	0.	0.	N2 TANK, +Z, LOWER
23	.0002	.0000	.0039	0.	0.	0.	N2 TANK, +Z, UPPER
24	.0002	.0001	.0010	0.	0.	0.	N2 TANK -Z, LOWER
25	.0002	.0002	.0003	0.	0.	0.	N2 TANK, -Z, UPPER
26	.0000	.0000	•0000	.0000	•0000		CM, FWD BULKHEAD
27	.0000	.0000	.0000	.0000	.0000	0000	
28	.0000	.0000	.0000	.0000	0000		SM, FWD BULKHEAD
29	.0801	.0000	.0000	.0001	.0000		SM, AFT BULKHEAD
30	.0001	.0017	.0002	0.	0.	0.	LOWER D LATCH, DA
31	.9904	.0037	.0026	0.	0.	0.	LOWER +Y TRUNNION
32	.0003	.0000	.0008	0.	0.	0.	LOWER -Y TRUNNION
33	.0005	.0005	.0000	0.	0.	0.	EREP PACKAGE C.G.
34	.0000	.0001	0000	0.	0.	0.	ATH PN 6,7 IF, OUTR
35	.0001	.0000	.0001	0.	0.	0.	ATH PN 4,5 IF, OUTR
36	.0000	.0000	.0002	0.	0.	0.	ATH PN 8,1 IF, OUTR
37	.0001	.0000	.0003	0.	a.	0.	ATH PN 2,3 IF, OUTR
38	.0001	.0002	.0000	0.	0.	Û.	ATM PN 6,7 IF, INNR
39	.0001	.0000	.0000	0.	0.	0.	ATH PN 4,5 IF, INNR
40	.0003	0000	.0002	0.	0.	0.	ATM PN 8,1 IF, INNR
41	.0004	.0002	.0003	Λ.	8.	0.	ATH PN 2,3 IF, INNR
42	.0000	.0001	.0000	.0000	.0000	0000	CMG, -Y SIDE
43	.0001	•9000	•0000	.0000	0000	.0000	CMG, +Y SIDE
44	.0001	.0000	.0002	0000	.0000	.0000	CMG, +X SIDE
45	.0013	.0013	0 •	0.	0.	G.	ATH SAS ,PN 1
45	.0000	.0000	0 •	0 •	0.	0.	ATH SAS, PN 3
47	.0004	.0004	9 •	0 •	0.	0.	ATH SAS, PN 5
48	.0001	.0001	0.	0.	0.	0.	ATH SAS, PN 7
49	.0000	.0001	.0001	.0002	.0001	0.	SPAR CENTER
50	.0000	.0001	.0001	0002	.0001		GRAZCAN DENTER
6 1414		4.0.5					
SUM	.0237	.4885	• 4779	.0019	.0051	.0019	

TABLE C-25

ORBITAL CONFIGURATION MODAL SURVEY ANALYTICAL HODES GENERALIZED MASS CONTRIBUTION SUMMARY

ANALYTICAL MODE 30

ANALYTICAL FREQUENCY = 9.405 HZ.

COMPONENT	GMC	GMC	GMC	GYC	GHC	GMC
NAME	(XC)	(DY)	(OZ)	(TX)	(TY)	(TZ)
BP/OWS SKIRT/IU/F1S	. 1688	.0023	.0021	.0000	.0003	.0001
5-FAS 02 TANKS	.1842	.0154	.0161	0.	9 •	0.
MD A/STS/AM	.0089	.0009	.0008	0000	0000	0000
6-AM N2 TANKS	.0019	.0006	.0025	0.	0.	0.
COMMAND/SERVICE MOD.	•5696	.0004	.0000	.0000	.0002	.0001
DEPLOYMENT ASSEMBLY	.0148	.0003	.0011	0.	0 •	0.
ATM-PACK, CMGS, 4-SAS	.0022	.0011	.0006	.0308	.0000	.0800
ATM-SPAR CENTER	.0001	.0001	.0000	.0000	.0002	0.
ATM-GRA/CAN CENTER	.0001	.0001	.0008	.0300	.0003	.0035
SUM	.9506	.0212	. 0235	.0300	.6011	.0035

BR/OWS SKIRT/IJ/FAS	.1737
6-FAS 02 TANKS	.2157
MDA/STS/AM	. 11136
6-AM N2 TANKS	.0052
COMMAND/SERVICE MOD.	.5703
DEPLOYMENT ASSEMBLY	.0152
ATM-RACK, CMGS, 4-SAS	.0039
ATM-SPAR CENTER	.8034
AT1-GRA/CAN CENTER	.0040

C-29 TABLE C-26

FREQUENCY=

9.41 47.

GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

ANALYTICAL MODE 33

NODE GMC GMC GMC GMC GMC GMC NOOF NO. (DX) (DY) (DZ) (TX) (TY) (TZ) DESCRIPTION .0834 .0012 .0016 .0088 .0001 .0001 BASE RNG/OWS SKIRT 2 .0241 .0001 .0000 .0000 .0001 -.0000 OWS/IU INTERFACE 3 .0410 .0001 .0000 -.0000 .0001 -. 0000 IU/FAS INTERFACE 0. 0. FAS 02 BOTL1.+Y +Z Ŀ .0321 .0021 .0105 O. 5 .0066 FAS 32 BOTL2,+Y +Z .0347 .0006 0. 0. G. Б FAS 02 BOTL3,-Y +Z .0252 .0003 -.0000 0. 0. 0. 0. 7 .0292 .0004 .0017 0. FAS 02 BOTL4,-Y +Z 0. -.0000 0. 8 .0345 .0014 FAS 02 BOTL5,-Y -Z O. 0. 9 .0060 FAS 02 BOTL6, -Y -Z .0284 .0019 0. 0. 0. 0. 1 11 .0038 .0000 .0000 0. 0. FAS/AM/DA IF. +Y 0. .0054 .0000 .0000 0. 0. FAS/AM/DA IF, +Z 11 FAS/AM/DA IF, -Y 12 .0057 .0001 -.0000 0. 0. Ü. 13 FAS/DA IF. -Y -Z .0014 .0007 .0004 0. 0. Û. .0000 14 .0027 .0000 O. 0. 0. FAS/AM IF, **-**Z 15 .0000 .0000 0. FAS/DA IF, +Y -7 .0012 0. 0. .0000 AM TUNNEL/SHEAR WB 15 .0000 .0000 .0000 .0001 .0002 17 .0001 .0000 .0000 -.0000 AM TUNNEL/STS IF .0013 .0002 18 -0035 -0004 .0003 -.0000 -.0000 --.0000 MDA/STS INTERFACE 19 .0039 .0003 .0002 -.0000 -.0000 -.0000 MDA CONE/CYL ITRFC 0. N2 TANK, +Y, LOWER 20 .0002 .0003 .0001 0. 0. N2 TANK, +Y, UPPER N2 TANK, +Z, LOWER 21 .0004 .0003 .0000 0. 0. 0. 0. .0002 22 .0000 .0012 0. 0. .0004 .0000 0. N2 TANK, +Z, UPPER 23 .0010 0. O. 0. 0. N2 TANK -Z, LOHER 24 .0004 .0000 .0002 0. 25 0. .0005 .0000 .0002 0. N2 TANK, -Z, UPPER .0001 .0002 CM, FWD BULKHEAD 25 .0780 .0000 -.0000 .0000 27 .1293 .0001 -.0000 .0000 .0001 .0001 CM, AFT BULKHEAD -. 0002 SM, FWD BULKHEAD 28 .1477 .0000 .0000 -.0000 -.0008 -.0001 SM. AFT BULKHEAD 29 -.0000 .2146 . .0002 .0000 .0000 0. .0003 LOWER D LATCH, DA 30 .0363 .0002 0. 0. 0. 31 .0035 -.0001 0. LOWER +Y TRUNNION .0003 0. .0000 0. LOWER -Y TRUNNION 32 .0027 .0002 0 . 0. 0. 33 .0023 .0000 .0003 0. 0. EREP PACKAGE C.G. ATM PN 6,7 IF, OUTR 34 .0000 .0001 .0002 0. 0. 0. 35 .0000 .0000 -.0000 0. 0. ATM PN 4,5 IF, OUTR 0. ATM PN 8,1 IF, OUTR 36 .0000 .0000 .0000 0. 0. 0. ATM PN 2,3 IF,OUTR ATM PN 6,7 IF,INNR 37 .0000 .0000 .0001 0. G. 0. .0002 0. 38 .0001 .0000 0. 0. 8. .0000 ATM PN 4,5 IF, INNR 39 .0001 -.0000 0. Ð. ATM PN 8,1 IF, INNR 40 .0004 .0000 .0000 0. 0. 0. .0001 ATM PN 2,3 IF, INNR 41 .0002 -.0000 0. 0. .0000 .0000 42 .0000 .0000 .0000 .0000 CMG, -Y SIDE .0000 .0000 .0000 .0000 43 .0001 -.0000 CMG, +Y SIDE .0000 .0000 .0000 CMG, +X SIDE .0000 44 .0001 .0000 ATM SAS , PN 1 0. 0. 45 .0002 .0002 0. 0. ATM SAS, PN 3 46 .0001 .0001 0. 0. 0. 0. .0004 ATM SAS, PN 5 47 .0004 0. 0. 0 。 0. 48 .0003 .0003 0. 0 . 0. 0 . ATM SAS, PN 7 .0000 .0000 .0002 SPAR CENTER 49 .0001 .0001 50 .0000 .0000 .0003 .0035 GRA/CAN DENTER .0001 .0001 -----------------SUM 9505 .0212 .0235 .0000 .0011 .0036

TABLE C-27

ORBITAL CONFIGURATION MODAL SURVEY ANALYTICAL HODES GENERALIZED MASS CONTRIBUTION SUMMARY

ANALYTICAL MODE 38 ANALYTICAL FREQUENCY = 12.072 HZ.

COMPONENT	GMC	GMC	GMC	GYC	GMC	GYC
NAME	(xa)	(DY)	(DZ)	(TX)	(TY)	(TZ)
BP/OWS SKIRT/IU/F4S	. 8004	.0194	.0178	.1245	.0001	.0003
6-FAS 02 TANKS	.0316	.0314	.0341	0.	0.	0.
MDA/STS/AM	0000	.0106	.0006	•6156	.0800	.0014
6-AM N2 TANKS	.0000	.0175	.0083	0.	0.	0.
COMMAND/SERVICE 400.	.0001	.0221	.0005	.0702	.0000	.0008
DEPLOYMENT ASSEMBLY	.0001	.0015	.0004	0.	0 •	0 •
ATM-RACK, CMGS, 4-SAS	.0001	.0001	.0001	•0100	.0000	• G Q D Q
ATH-SPAR CENTER	.0000	.0000	.0000	.0001	.0000	0.
ATM-GRA/CAN CENTER	.0000	.0000	.0000	.0081	.0000	.0000
SUM	.0323	• 10 27	.0619	.8165	.0002	.0025

BR/OWS SKIRT/IJ/FAS	.1624
6-FAS 02 TANKS	.0971
MD4/STS/AM	.6132
6-4M N2 TANKS	.0258
COMMAND/SERVICE MOD.	. 1938
DEPLOYMENT ASSEMBLY	.0021
ATM-RACK, CMGS, 4-SAS	.0003
ATY-SPAR CENTER	.0011
ATM-GRA/CAN CENTER	.0002

C-31 TABLE C-28

GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

ANALYTICAL MODE 33 FREQUENCY= 12.07 4Z.

NODE	GMC	GMC	GMC	GMC	340	GMC	NODE
40 •	(XQ)	(PY)	(DZ)	(TX)	(TY)	(TZ)	DESCRIPTION
1	.0000	.0061	.0000	.0769	.0000		BASE RNG/OWS SKIRT
2	.0000	0000	.0001	.0185	.0000		OWS/IU INTERFACE
3	0000	.0003	.0001	.0291	.0000	.0001	IU/FAS INTERFACE
4	•0052	.0007	.0037	0 •	0.	0.	FAS 02 B)TL1,+Y +Z
5 6	.0947	.0070	.8140	ប •	0.	0.	FAS 02 B3TL2,+Y +Z
	•0063	.0038	.0062	0.	0.	0.	FAS 02 BOTL3,-Y +Z
7	.0060	.0039	.0041	0.	8.	0.	FAS 02 BJTL4,-Y +Z
8	•9847	.0131	•0050	0.	0.	0.	FAS 02 BOTL5,-Y -Z
9	.0046	.0028	.0011	O •	0.	0.	FAS 32 BOTL6,-Y -Z
10	.0002	.0000	.0042	0.	0.	0.	FAS/AM/DA IF, +Y
11	.0000	.0164	.0000	0 • ਼	0.	0.	FAS/AM/DA IF, +Z
12	.0002	.0002	.0132	0 • ·	8.	0.	FAS/AM/DA IF, -Y
13	.0000	8600	0001	0.	0.	0.	FAS/DA IF, -Y -Z
14	0000	.0023	.0000	0.	0.	0.	FAS/AM IF, -Z
15	.0000	.0001	.0001	0.	0.	0.	FAS/DA IF, +Y -Z
15	•0000	•0003	.0000	.0121	.0000		AM TUNNEL/SHEAR HB
17	.0000	•0002	• 0 0 0 0	.1454	.0000		AM TUNNEL/STS IF
18	.0000	.0022	.0003	.2420	0000		MDA/STS INTERFACE
19	0000	.0080	.0002	.2061	.0000		MDA CONE/CYL ITRFC
53	.0000	.0003	0000	0.	0.	0.	N2 TANK, +Y, LOWER
21	0000	.0002	00082	0.	0•	0.	N2 TANK, +Y, UPPER
22	.0000	.8015	.0000	0.	0.	8.	N2 TANK, +Z, LOWER
23	.0000	.0048	.0000	0.	0.	0. 0.	N2 TANK, +Z, UPPER N2 TANK -Z, LOWER
24	.0000	.0002	.0000 .0000	8.	0. 0.	G •	N2 TANK, -Z, UPPER
25	.0000	.0106	.0001	0. .0170	•0000		CM, FWD BULKHEAD
26 27	.0000 .0000	.0005 .0168	.0001	.0108	.0000		CM, AFT BULKHEAD
21 28	•0000	.0015	0000	.0125	.0000		SM, FWD BULKHEAD
29	.0000	.0032	.0004	.0298	.0000		SH, AFT BULKHEAD
30	.0001	.0005	.0001	0.	0.	0.	LOHER D .ATCH, DA
31	.0800	.0002	0002	0.	0.	0.	LOWER +Y TRUNNION
32	.0000	0001	.0005	0.	0.	0.	LOWER -Y TRUNNION
33	.0000	.0010	0000	0.	0.	0.	EREP PACKAGE C.G.
34	.0000	•0000	0000	0.	0.	0.	ATH PN 6,7 IF, OUTR
35	. 9000	.0000	.0001	8 .	0.	0.	ATM PN 4,5 IF, OUTR
35	.0000	.0000	.0000	0.	0.	0.	ATM PN 8,1 IF, OUTR
37	.0000	.0000	.0000	0.	0.	0.	ATM PN 2,3 IF, OUTR
38	.0000	.0000	.0000	8.	0.	8.	ATM PN 6,7 IF, INNR
39	.0000	.0000	.0000	0.	0.	0 •	ATM PN 4,5 IF, INNR
49	.0000	0000	.0000	0.	0.	0.	ATM PN 8,1 IF, INNR
41	.0000	.0000	.0000	0.	0.	0.	ATM PN 2,3 IF, INNR
42	.0000	.0000	.0000	.0000	.0000	.0000	
43	.0000	•0000	.0000	.0000	0030.	.0000	
44	.0000	•0000	.0000	.0000	.0000	.0000	CMG, +X SIDE
45	.0000	.0000	0.	0.	0.	0.	ATM SAS ,PN 1
46	.0000	.0000	0.	0.	0.	0.	ATM SAS, PN 3 ATM SAS, PN 5
47 6.8	• 0 0 0 0	0000	0.	0 • 0 •	0. 0.	0 • 0 •	ATM SAS, PN 7
4 B	.0000	0000	•0000	.0001	.0000	8.	SPAR CENTER
49 50	.0000	.0000 .0000	.0000	.0001	.0000		GRAZCAN SENTER
90				*0001			THE CHIEF CHIEF
SUM	.0323	.1027	.0619	. 8005	.0002	.0025	
3011	# 0 0 E 0		10017				

TABLE C-29

ORBITAL CONFIGURATION MODAL SURVEY ANALYTICAL MODES GENERALIZED MASS CONTRIBUTION SUMMARY

ANALYTICAL MODE 39 ANALYTICAL FREQUENCY = 12.568 HZ.

COMPONENT	GMC	GMC	GMC	Ğ4C	GMC	GYO
NAME	(XO)	(YO)	(DZ)	(TX)	(TY)	(TZ)
BP/OWS SKIRT/IU/F1S	.0109	.0771	• 0235	.0001	.0040	.0128
5-FAS 02 TANKS	.8619	.0933	• 1114	0.	0 •	0.
MDA/STS/AM	.0000	.0908	.0141	.0003	.0004	.0325
5-AM N2 TANKS	.0054	.3082	.0437	0.	8.	0.
COMMAND/SERVICE MOD.	.0006	.0060	.0012	.0003	.0001	.0003
DEPLOYMENT ASSEMBLY	.0107	.0868	.0153	0.	8 •	0.
ATM-PACK, CMGS, 4-SAS	.0039	.8015	• 00 34	.0300	.0001	.0000
ATM-SPAR CENTER	.0004	.0005	0000	.0128	.0004	٥.
ATM-GRA/CAN CENTER	.0004	.0804	• 00 00	.0034	.0008	0000
SUM	.0946	.6545	•2126	.0169	.0058	.0156

BR/OWS SKIRT/IU/FAS	.1284
6-FAS OZ TANKS	• 2655
MD4/STS/AM	.1031
6-AM N2 TANKS	• 3533
COMMAND/SERVICE MOD.	.0078
DEPLOYMENT ASSEMBLY	.1129
AT4-RACK, CMGS, 4-SAS	.0088
ATM-SPAR CENTER	.0041
ATY-GRA/CAN CENTER	.0051

C-33 TABLE C-30

GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

ANALYTICAL MODE 39 FREQUENCY= 12.57 4Z.

NODE	GMC	GMC	GM C	GMC	SMC	GMC	NODE
NO.	(XO)	(DY)	(DZ)	(TX)	(TY)	(TZ)	DESCRIPTION
1	.0001	.C128	.0016	.0001	.0320	.0054	BASE RNG/OWS SKIRT
2	.0000	.0096	.0029	.0000	0000		OWS/IU INTERFACE
3	0001	•0197	.0058	.6000	.0020		IU/FAS INTERFACE
4	.0166	.0050	.0024	0 •	0.	0 •	FAS 02 B)TL1,+Y +Z
5	.0876	.0022	.0106	0.	0.	0.	FAS 02 BJTL2,+Y +Z
6	0004	.0067	.0747	0.	0.	0.	FAS 02 BOTL3,-Y +Z
7	.9046	.0704	.0056	0 •	0.	0.	FAS 02 BOTL4,-Y +Z
8	.0182	.0024	0002 .0183	0.	0.	0.	FAS 32 B3TL5, -Y -Z
9 10	•0152 •0050	•9065 •0004	•0163 •0048	0. 0.	0. 0.	8. 0.	FAS 32 B3TL6,-Y -Z FAS/AM/D4 IF, +Y
11	• 0008	.0208	.0800	0.	0.	0.	FAS/AM/D4 IF, +Z
12	.0039	.0002	•0059	0.	0.	0.	FAS/AM/DA IF, -Y
13	.0001	.0002	0003	0.	0.	0.	FAS/DA IF, -Y -Z
14	.0004	.0100	.0004	0.	0.	0.	FAS/AM IF, -Z
15	.0005	.0034	.0014	0.	ů.	0.	FAS/DA [F. +Y -Z
15	.3000	.0394	.0055	.0000	.6305		AM TUNNEL/SHEAR WB
17	.0000	.0163	.0019	.0002	.0002		AM TUNNEL/STS IF
18	.9000	.0281	.0042	0000	0033		MDA/STS INTERFACE
19	.0000	.0069	.0014	.0002	.0001	.0008	MDA CONE/CYL ITRFC
20	.0011	.1861	.0001	0.	0.	0.	N2 TANK, +Y, LOWER
21	.8034	•1139	.0000	0 •	0•	0 •	N2 TANK, +Y, UPPER
22	.0003	.0025	.0217	0.	0.	0.	N2 TANK, +Z, LOHER
23	.0006	.0007	.0111	0.	0.	0.	N2 TANK, +Z, UPPER
24	.0004	.0023	.0070	0.	0.	0.	N2 TANK -Z, LOWER
25 25	.0005	.0026	.0038	0. .0000	0. .0000	0.	N2 TANK, +Z, UPPER
27	.0000	0000 .0050	.0000 .0010	.0001	.0000	.0001	CM, FWO BULKHEAD CM, AFT BULKHEAD
28	.0000	•0002	.0000	.0001	0000	.0000	· · · · · ·
29	.0000	.0008	.0001	.0001	.0000	.0000	
30	.0006	.0317	.0018	0.	0.	û .	LOWER D LATCH, DA
31	.0054	.0486	.0016	0.	0.	0.	LOWER +Y TRUNNION
32	.0039	.0058	.0119	0.	0.	0.	LOHER -Y TRUNNION
33	.0009	.0009	.0000	0.	0.	0.	EREP PACKAGE C.G.
34	.0000	.0003	0000	0 •	0.	8.	ATM PN 6,7 IF, OUTR
35	.0005	0000	.0018	0.	0 •	0.	ATM PN 4,5 IF, OUTR
35	0000	0000	.0002	0.	0 •	0.	ATM PN 8,1 IF, OUTR
37	.0003	.0001	•0000	0.	0.	0.	ATH PN 2,3 IF, OUTR
38	.0002	.0002	•0000	0.	0.	0.	ATM PN 6,7 IF, INNR
39	.0002	.0000	•0006	0.	0.	8.	ATM PN 4,5 IF, INNR
40	.0007	0000	.0001	0.	0.	0.	ATM PN 8,1 IF, INNR ATM PN 2,3 IF, INNR
41 42	.0010 .0000	.9005 .0003	.0000 .0005	· 0000	.0000	0.	CMG, -Y SIDE
43	.0003	.0000	•0000	0000	.0000	.0000	
44	.0004	.0000	.0001	.0000	.0000	.0000	
45	.0000	.0000	D.	0.	0.	0.	ATH SAS ,PN 1
46	.0000	.0000	0.	0.	0.	0.	ATH SAS, PN 3
47	.0000	.0000	0.	0.	0.	0.	ATH SAS, PN 5
48	.0000	.0000	0.	0.	G •	0.	ATM SAS, PN 7
49	.0004	.0005	0000	.0028	.0084	0.	SPAR CENTER
50	.0004	.0004	.0000	.0034	.0008		GRAZCAN CENTER
SUM	.0946	.6546	. 2126	.0069	.0058	· G 156	

TABLE C-31

ORBITAL CONFIGURATION MODAL SJRVEY ANALYTICAL MODES GENERALIZED MASS CONTRIBUTION SUMMARY

ANALYTICAL MODE 41 ANALYTICAL FREQUENCY = 13.323 HZ.

COMPONENT	GMC	GMC	GMC	G4C	GMC	GMC
NAME	(XQ)	(DY)	(DZ)	(TX)	(TY)	(TZ)
BP/OWS SKIRT/IU/F4S	.0001	.0026	.0088	.0005	.0035	.0310
5-FAS 02 TANKS	.0041	.0062	.0030	0.	0.	0.
MDA/STS/AM	0000	.0804	.2239	.0311	.0257	.0080
6-AM N2 TANKS	.0005	. 0555	. 1285	0.	3 •	0.
COMMAND/SERVICE MOD.	0000	.1048	. 3079	.0347	• G146	.0048
DEPLOYMENT ASSEMBLY	.0003	.0042	.0041	Û•	0 •	0 •
ATM-RACK, CMGS, 4-SAS	.0004	.0001	.0002	.0388	.0000	.0000
ATM-SPAR CENTER	.0000	.0000	.0000	.0301	.0000	0 •
ATM-GRA/CAN CENTER	.0001	• 0 000	.0000	.0001	.0003	.0000
SUM	.0054	. 2538	. 6766	.0365	.0438	.0139

BR/OWS SKIRT/IU/FAS	.0166
- 11	
6-FAS 02 TANKS	.0133
MDA/STS/AH	.3391
6-AM N2 TANKS	.1845
COMMAND/SERVICE MOD.	• 4358
DEPLOYMENT ASSEMBLY	.0036
ATM-RACK, CMGS, 4-SAS	.0017
AT1-SPAR CENTER	.0002
ATY-GRA/CAN CENTER	.0003

C-35 TABLE C-32

GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

ANALYTICAL MODE 41 FREQUENCY= 13.32 4Z.

		•					
NODE	GMC	GMC	GMC	GMC	SMC	GMC	NODE
NO.	(מֹצֹים)	(PY)	(07)	(TX)	(TY)	(TZ)	DESCRIPTION
40.	(04)	(517	(0.7	(1//	(117	(12)	0130KIF 110N
	0000	.0014	.0043	.0003	.0322	0007	GACE ONCLOUS SKIDT
1	.0000						BASE RNG/OWS SKIRT
2	.0000	.0001	.0002	.0001	.0003		OWS/IU INTERFACE
3	0000	.0003	.0011	.0001	.0010		IU/FAS INTERFACE
4	.0004	.0004	.0001	0 •	0.	0.	FAS 02 BOTL1,+Y +Z
5	.0005	.0003	.0092	0.	0.	0.	FAS 02 BOTL2,+Y +Z
5	.0004	.0005	.0027	0.	0.	0.	FAS 02 BJTL3,-Y +Z
7	0000	.0039	0000	0.	0.	0.	FAS 32 83TL4,-Y +Z
8	.0038	.0009	.0001	0.	0.	0.	FAS 02 BOTL5, -Y -Z
9	.0019	.0003	.0000	0.	0.	ũ.	FAS 02 BOTL6, -Y -Z
10	.0000	.0001	.0006	0.	0.	0.	FAS/AM/DA IF, +Y
11	.0000	.0003	.0004	0.	0.	0.	FAS/AM/DA IF, +Z
12	3033	.0001	.0019	0.	0.	0.	FAS/AM/OA IF, -Y
13	.0000	0000	.0000	0.	0.	0.	FAS/DA IF, -Y -Z
14	.0000	.0003	.0001	0.	0.	0.	FAS/AM IF, -Z
15	.0000	.0001	0001	0.	O .	0.	FAS/DA IF, +Y -Z
16	.0000	.0019	0037	.0001	.0011	.0005	AM TUNNEL/SHEAR WB
17	.0000	.0000	"0003	.0005	.0327	.0013	AM TUNNEL/STS IF
18	0000	.0223	.0702	0002	.0198		MDA/STS INTERFACE
19	0000	.0561	.1496	.0008	.0322		MDA CONE/CYL ITREC
20	.0000	.0326	0078	0.	0.	0.	N2 TANK, +Y, LOWER
21	.0001	.0169	.0010	0.	0.	0.	N2 TANK, +Y, UPPER
22	.0000	.0035	.0768	0.	0.	0.	N2 TANK, +Z, LOWER
?3	.0072	.0006	.0390	0.	0.	0.	N2 TANK, +Z, UPPER
24	.0001	.0017	.0036	0.	0.	0.	N2 TANK -Z, LOWER
25	.0000	.0001	.0004	0.	0.	0 •	NZ TANK, -Z, UPPER
26	3000	.0018	.0038	.0000	.3351		CM, FWD BULKHEAD
27	0000	.0906	.2644	.0020	.0)85	.0027	CH, AFT BULKHEAD
28	.0000	.0018	.0053	.0013	.0000	.0000	SM, FWD BULKHEAD
29	.0000	.3107	0345	.0013	.0010	.0006	SM, AFT BULKHEAD
30	.0001	.0007	• 0 00 4	0.	0.	0.	LOWER D LATCH, DA
31	.0001	.0030	.0012	0.	0.	0.	LOWER +Y TRUNNION
32	0000	.0005	.0026	0.	0.	0.	LOWER -Y TRUNNION
33	.0001	.0000	0000	0.	0.	0.	EREP PACKAGE C.G.
34	.0000	.0000	0000	0.	0.	0.	ATM PN 6,7 IF, OUTR
3 5	.0000	.0000	•0001				ATM PN 4,5 IF, OUTR
	.0000			0.	0.	0.	
36		.0000	0000	8.	0.	0.	ATH PN 8,1 IF, OUTR
37	.0000	.0000	.0000	0.	0.	0.	ATM PN 2,3 IF, OUTR
38	.0000	.0000	0000	0.	0.	0 •	ATH PN 6,7 IF, INNR
39	.0000	-•0000	•0000	0.	0 •	3.	ATM PN 4,5 IF, INNR
40		.0000	0000	0.	0.	0.	ATM PN 8,1 IF, INNR
41	.0031	.0000	.0000	0.	0.	0.	ATH PN 2,3 IF, INNR
42	.0000	.0000	.0000	.0000	.0300	.0000	CMG, -Y SIDE
43	.0000	.0000	.0000	.0000	.0000	.0000	CMG, +Y SIDE
44	.0901	.0000	.0000	.0000	.0000	.0000	CMG, +X SIDE
45	.0000	.0000	0 •	0.	0.	0.	ATH SAS , PN 1
46	0000	0000	0.	0.	0.	0.	ATM SAS, PN 3
47	.0000	.0000	0.	0.	0.	0.	ATH SAS, PN 5
48	0000	0000	0.	0.	0.	0.	ATH SAS, PN 7
49	.0000	.0000	.0000	.0001	.0000	0.	SPAR CENTER
5 O	.0001	.0000	.0000	.0001	.0000		
J (10001			.0001			GRA/CAN SENTER
SUM	.0054						
JUM	• U U 7 4	•2538	. 6766	.0065	.0438	.0139	

TABLE C-33

ORBITAL CONFIGURATION MODAL SJRVEY ANALYTICAL MODES GENERALIZED MASS CONTRIBUTION SUMMARY

ANALYTICAL MODE 45 ANALYTICAL FREQUENCY = 14.855 HZ.

COMPONENT	GMC	GMC	GMC	G4C	GMC	G43
NAME	(XQ)	(DA)	(DZ)	(TX)	(TY)	(TZ)
RRIONS SKIRT/IU/FAS	.0024	.0216	.0005	.0313	.0000	.0003
6-FAS OZ TANKS	.0078	.0061	.0100	0.	0.	G.
MDA/STS/AM	.0005	. 1437	.0059	.0312	.0013	.8274
6-AM N2 TANKS	.0075	.5540	.0191	0.	0.	ð.
COMMAND/SERVICE 430.	.0005	.0922	.0087	.0142	.0005	.0344
DEPLOYMENT ASSEMBLY	.0013	•63 3 8	.0024	0 •	0 •	0.
ATM-RACK, CMGS, 4-SAS	.0053	.0007	.0016	.0388	.0001	.0000
ATH-SPAR CENTER	.0008	.0008	0000	.0040	.0045	8.
ATH-GRA/CAN CENTER	.0010	.0006	.0000	.0049	.0071	.0991
SUH	.0269	.8534.	.0482	.0257	.0136	.0323

BR/OWS SKIRT/IU/FAS	• 0251
6-FAS 02 TANKS	.0239
MDA/STS/AM	.1801
6-AM N2 TANKS	.5836
COMMAND/SERVICE MOD.	.12]6
DEPLOYMENT ASSEMBLY	.0374
AT4-RACK, CMGS, 4-SAS	.0074
AT1-SPAR CENTER	.0101
AT4-GRA/CAN CENTER	.0138

C-37 TABLE C-34

GENFPALIZED HASS CONTRIBUTIONS BY DEGREE OF FREEDOM

ANALYTICAL MODE 45 FREQUENCY= 14.85 HZ.

NODE NO.	GMC (DX)	GMC (DY)	GMC (DZ)	GMC (TX)	SMC (TY)	GMC (TZ)	NODE Description
1	.0000	.0133	•0001	.0010	.0000		BASE RNG/OWS SKIRT
2 3	.0000	.0009	.0000	.0001	.0000		OWS/IU INTERFACE
	.0000 .0026	.0014 .0009	•0000 •0003	.0002 0.	•0000 0•	0.0004	IU/FAS INTERFACE FAS 02 BOTL1,+Y +Z
5	0026	.0009	•0003	0.	0.	0.	FAS 32 B3TL2,+Y +Z
5	.0001	.0000	.0013	0.	0.	0.	FAS 02 BJTL3,-Y +Z
7	.0034	.0009	.0013	0.	0.	0.	FAS 02 BOTL4,-Y +Z
8	.0014	.0036	.0016	0.	0.	0.	FAS 02 80TL5,-Y -Z
9	.0004	.0006	.0044	0.	0.	0.	FAS 02 BOTL6,-Y -Z
10	.0010	.0011	.0001	0.	0.	0.	FAS/AM/DA IF, +Y
11	.0000	.0015	.0000	0.	0.	0.	FAS/AM/DA IF, +Z
12	.0013	.0022	.0002	0.	Œ.	0.	FAS/AM/Ol IF, -Y
13	.0000	.0803	0000	0.	0.	0.	FAS/DA IF, -Y -Z
14	•0000	.0005	0000	0 •	0.	0.	FAS/AM IF, -Z
15	.0001	.0004	.0000	0.	0.	0.	FAS/DA IF, +Y -Z
16	.0000	.0785	.0011	.0001	.0001		AM TUNNEL / SHEAR WB
17 18	.0002 .0002	.0269 0018	.0001 .0010	.0005 .0007	.0002 .0008		AM TUNNE./STS IF MOA/STS INTERFACE
19	.0002	.0401	.0038	0003	•0003		MDA CONE/CYL ITRFC
50	.0051	.0887	.0027	0.	8.	0.	N2 TANK, +Y, LOWER
21	.0011	-2065	•0000	0.	0.	0.	NZ TANK, +Y, UPPER
55	.0002	.1550	.0002	0.	0.	0.	N2 TANK, +Z, LOWER
23	.0000	.0267	.0027	0.	0.	0.	N2 TANK, +Z, UPPER
24	.0000	.0486	.0074	0.	0.	0.	N2 TANK -Z, LOWER
25	.0001	•9285	.0051	ũ.	0.	0 •	N2 TANK, -Z, UPPER
25	.0001	.0034	•0000	.0037	.0002		CM, FWD BULKHEAD
27	.0002	.0788	.0076	.0063	.0003	.0024	
28	.0001	.0011	.0002	.0008	.0000	0000	
29	.0002	.0089	.0009	.0034	.0000		SM, AFT BULKHEAD
30 31	.0001 .0006	.0049 .0156	.0006 .0011	0 • 0 •	0.	0. 0.	LOWER D LATCH, DA
32	.0005	.0131	.0006	0.	0.	0.	LOWER +Y TRUNNION LOWER -Y TRUNNION
33	.0000	.0000	.0000	0.	0.	0.	EREP PACKAGE C.G.
34	0000	.0003	.0000	0.	0.	0.	ATH PN 6,7 IF, OUTR
35	.0001	0000	.0010	0.	0.	0.	ATM PN 4,5 IF, OUTR
36	.0000	0000	.0000	0.	0.	0.	ATH PN 8,1 IF, OUTR
37	0000	.0000	.0000	0.	0.	0.	ATM PN 2,3 IF, OUTR
38	.0004	.0002	.0000	0 •	3 •	0.	ATM PN 6,7 IF, INNR
39	.0016	•0002	.0003	0 •	0.	0.	ATM PN 4,5 IF, INNR
40	.0009	.0000	0000	0.	0.	0.	ATM PN 8,1 IF, INNR
41 42	.0008 .0033	.000 0000	0000 .0003	•0000	.0000	0.	ATM PN 2,3 IF, INNR
43	.0003	.0000	.0000	•0000	.0000	.0000	CMG, -Y SIDE CMG, +Y SIDE
44	.0005	.0000	.0000	.0000	.0000	.0000	
45	.0000	.0000	0.	0.	0.	0.	ATM SAS , PN 1
46	.0000	.0000	0.	D •	G.	0.	ATH SAS, PN 3
47	.0000	.0000	0.	0.	0.	0.	ATM SAS, PN 5
48	0000	0000	0.	8.	0.	0.	ATH SAS, PN 7
49	.0008	.0008	0000	.0040	.0045	0.	SPAR CENTER
50	.0010	.0006	.0000	.0049	.0071		GRAZCAN DENTER
61114	0.250	0574	04.00	44.00	0476		
SUM	.0269	.8534	.0482	.0257	.0136	•0323	

TABLE C-35

ORBITAL CONFIGURATION MODAL SURVEY ANALYTICAL 10DES GENERALIZED MASS CONTRIBUTION SUMMARY

ANALYTICAL MODE 56 ANALYTICAL FREQUENCY = 17.553 HZ.

COMPONENT	GMC	GMC	GMC	G4C	GMC	GMC
NAME	(DX)	(PY)	(DZ)	(TX)	(TY)	(TZ)
98/OWS SKIRT/IU/F4S	.0001	.0037	.0150	.0100	.0018	0000
5-FAS 02 TANKS	.0239	.0181	.0158	J .	0.	0.
MNA/STS/AM	.0010	.0017	.1869	•0309	.0317	.0005
6-AM N2 TANKS	.0101	.0041	.6978	0 •	0.	0.
COMMAND/SERVICE MOD.	.0001	.0016	.0545	.0010	.0031	.0081
DEPLOYMENT ASSEMBLY	.0014	.0121	.0007	0.	0.	0.
ATH-RACK, CMGS, 4-SAS	.0007	.0013	.0005	.0001	.0000	.0000
ATM-SPAR CENTER	.0000	.0000	.0000	.0100	.0000	0.
ATM-GRA/CAN CENTER	.0001	.0001	.0000	.0000	.0001	.0000
SUM	.0374	.0426	.8814	.0021	.0359	.0005

BR/OWS SKIRT/IJ/FAS	.0137
6-FAS OZ TANKS	.0579
MDA/STS/AM	• 2227
6-4M N2 TANKS	•6220
COMMAND/SERVICE MOD.	.0635
DEPLOYMENT ASSEMBLY	.0142
AT1-RACK, CMGS, 4-SAS	.0026
AT1-SPAR CENTER	.0002
ATM-GRA/CAN CENTER	.0032

C-39 TABLE C-36

GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

ANALYTICAL HODE 35 FREQUENCY= 17.55 4Z.

NODE.	GMC (DX)	GMC (DY)	GMC (DZ)	GMC (TX)	SMC (TY)	GMC (TZ)	NOJE Description
140	(34)	(01)	(02)	****	,		5230KI: 115K
1	.3000	.0023	.0012	.0000	.0006		BASE RNG/OWS SKIRT
2	0000	.0000	.0003	.3000	•000G	.0000	
3	0000	.0000	.0005	0000	.0004		IU/FAS INTERFACE
4	.0141	.0184	•0022	0.	0.	0.	FAS 02 B3TL1,+Y +Z
5 6	.0013 .0042	.0005 .0027	.0085 .0004	0. 0.	0. 0.	0.	FAS 02 B)TL2,+Y +Z FAS 02 B)TL3,-Y +Z
7	.0042	.0010	.0012	0.	0.	0.	FAS 32 B3TL4,-Y +Z
8	.8038	.0033	.0003	0.	0.	0.	FAS 32 B3TL5,-Y -Z
9	0002	.0002	.0032	0.	9.	0.	FAS 02 BOTL5,-Y -Z
10	.0000	0000	.0025	0 •	0.	0.	FAS/AM/DA IF, +Y
11	.0000	.0006	.0057	0.	0.	0.	FAS/AM/DA IF, +Z
12	.0000	.0000	.0020	0.	0.	0.	FAS/AM/DA IF, -Y
13	0000	•0005	.0008	0.	G.	0.	FAS/DA IF, -Y -Z
14	.0001	0000	.0020	0 •	0•	0.	FAS/AM IF, -Z
15	.0000	.9002	.0000	0.	0.	0.	FAS/DA IF, +Y -Z
15	.0001	•0005	.0723	.0003	.0007		AM TUNNEL/SHEAR WB
17	.0001	.0003 0000	.0580 .0338	.0002 .8004	.0104 .0064		AM TUNNEL/STS IF MDA/STS INTERFACE
18 19	.0003 .0005	•0009	.0127	.0001	.0143		MDA CONE/CYL ITRFC
20	.0001	•0001	.3439	0.	0.	0.	N2 TANK, +Y, LOWER
21	.0000	.0000	.0859	0.	0.	0.	N2 TANK, +Y, UPPER
22	.0038	.0020	.0163	0.	9.	ŭ.	N2 TANK, +Z, LOWER
23	.0015	.0005	.0117	0 •	0.	0.	N2 TANK, +Z, UPPER
24	.0042	.0009	.1095	0 •	0.	3 •	N2 TANK -Z, LOWER
25	.0003	.0005	.0395	0.	0.	0.	N2 TANK, -Z, UPPER
25	0000	.0001	.0137	.0002	.0012		CM, FHD BULKHEAD
27	.0001	.0014	.0385	.0006	.0319	.0001	
28	.0000	.0000	.0003	.0001	.0000	0000	SM, FWD BULKHEAD
59	.0000	.0002	.0020	.0002	.0000	.0000	
30 31	.0016 0001	0004 .0001	0001 -0009	0 • 0 •	0. 0.	0.	LOWER D LATCH, DA LOWER +Y TRUNNION
32	0001	.0124	0000	0.	0.	0.	LOWER -Y TRUNNION
33	0000	.0000	.0000	0.	0.	0.	EREP PACKAGE C.G.
34	.0000	.0000	.0002	0.	0.	0.	ATH PN 6,7 IF, OUTR
35	.0000	.0000	.0001	0.	0.	0.	ATM PN 4,5 IF, OUTR
36	.0000	.0000	.0001	6.	G •	0.	ATM PN 8,1 IF, OUTR
37	.0001	0000	•0000	0 •	0.	0 •	ATH PN 2,3 IF, OUTR
38	.0000	.0004	.0001	0.	0.	0.	ATM PN 6,7 IF, INNR
39	.0003	.0003	-0000	0.	0.	0.	ATH PN 4,5 IF, INNR
40	.0002	0000	.0000	0.	0.	0 •	ATM PN 8,1 IF, INNR
41	0000	.0001 .0005	.0000 .0000	0.	0.	0.	ATM PN 2,3 IF, INNR
42 43	.0000	.0000	.0000	.0001	.0000	.0000	CMG, -Y SIDE CMG, +Y SIDE
44	.0000	.0000	.0000	•0000	.0000	.0000	
45	.0000	.0000	0.	0.	0.	0.	ATH SAS , PN 1
46	0000	0000	0.	0.	0.	0.	ATH SAS, PN 3
47	.0000	.0000	0 •	0.	0.	0.	ATH SAS, PN 5
48	.0000	.0000	0.	0.	G.	0 •	ATH SAS, PN 7
49	.0000	.0000	.0000	.0000	.0000	0.	SPAR CENTER
50	.0001	.0001	.0000	.0000	.0001		GRAZCAN CENTER
SJM	.0374	- 14 26	.8814	.0021	.0359	-0005	

TABLE C-37

ORBITAL CONFIGURATION MODAL SURVEY ANALYTICAL HODES GENERALIZED MASS CONTRIBUTION SUMMARY

ANALYTICAL HODE 58 ANALYTICAL FREQUENCY = 18.361 HZ.

COMPONENT	GMC	GMC	GMC	GYC	GHC	GMC
NAME	(XD)	(DY)	(DZ)	(TX)	(TY)	(TZ)
BP/OWS SKIRT/IU/FAS	.0013	.3390	.0130	.8317	0004	0017
6-FAS 02 TANKS	.1976	.0191	. J202	0.	0.	0.
MD A/STS/ AM	.0005	.0421	.0016	.0320	.0001	.0054
6-AM N2 TANKS	.0011	.5897	.0038	0.	0.	0.
COMMAND/SERVICE MOD.	.0002	.0182	.0000	.0304	.0008	.0009
DEPLOYMENT ASSEMBLY	.0009	.0056	.0051	0.	0 •	0.
ATM-PACK, CMGS, 4-SAS	.8188	.0064	.0072	.0002	.0005	.0000
ATM-SPAR CENTER	.0079	.0016	.0000	.0072	.0154	0.
ATH-GRA/CAN CENTER	.0125	-0004	.0000	.0192	.0188	.0057
SUM	.2402	• 6422	.0511	.0207	.0344	.0113

BR/OWS SKIRT/IJ/FAS	.0530
6-FAS 02 TANKS	•2359
MD4/STS/AM	.0526
6-AM N2 TANKS	.5146
COMMAND/SERVICE MOD.	.0198
DEPLOYMENT ASSEMBLY	.3116
ATM-RACK, CMGS, 4-SAS	.0324
AT4-SPAR CENTER	. 0 32 2
AT1-GRA/CAN CENTER	.0458

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GENERALIZED MASS CONTRIBUTIONS BY DEGREE OF FREEDOM

ANALYTICAL MODE 53 FREQUENCY= 18.36 4Z.

			•				
NODE	GMC	GMC	GH C	GMC	3 M C	GMC	NODE
NO.	(DX)	(DY)	(DZ)	(TX)	(TY)	(TZ)	DESCRIPTION
1	.0000	.0264	.0074	.3014	.0002	0002	BASE RNG/OWS SKIRT
2	0000	.000	.0001	.0002			OHS/IU INTERFACE
3	0000	0001	.0002	.0002	0007		IU/FAS INTERFACE
4	.0384	.9062	0001	0.	0.	0.	FAS 02 BOTL1,+Y +Z
5	.1715	.0016	.0081	0.	0.	0.	FAS 02 BOTL2,+Y +Z
ś	.0051	•0 0 24	.0053	0.	0.	0.	FAS 32 B3TL3,-Y +Z
7	.0051	.0025	.0007	0.	0.	0.	FAS 02 BOTL4,-Y +Z
9	.3326	.0047	.0007	0.	0.	0.	FAS 02 BOTL5, -Y -Z
9	. 1449	.0017	.0057	0.	0.		FAS 02 BJTL6,-Y -Z
13	.0003	.0018	.0001	0.	0.	0.	FAS/AM/DA IF, +Y
11	.0003	.0034	0000	0.	0.	0•	FAS/AM/DA IF, +Z
12	.1004	.0020	.0000	0 •	0.	0.	FAS/AM/DA IF, -Y
13	•3004	.0047	.0050	0.	0.	0.	FAS/DA IF, -Y -Z
14	.0000	.0007	0000	0 •	0.	0.	FAS/AH IF, -Z
15	.0030	.0001	.0002	0.	0.	0.	FAS/DA IF, +Y -Z
15	• 0 0 0 0	.0104	.0007	.0000			AM TUNNEL/SHEAR WB
17	.0001	.0200	.0002	.0002 .0006	.0000		AM TUNNEL/STS IF
18	.0002	.0058	.0006	.0006	0001		MDA/STS INTERFACE
19	.0002	•0059	.0001	.0011	.0000	.0021	MDA CONE/CYL ITRFC
20	.0001	.0010	.0023	0.	0.	0.	N2 TANK, +Y, LOWER
21	.0000	.0031	.0007	0.	0.	0.	N2 TANK, +Y, UPPER
22	.0006	.0104	.0001	0.	0 •	0.	N2 TANK, +Z, LOWER
23	.0002	.0653	.0000	0 •	0 •	0.	N2 TANK, +Z, UPPER
24	.0302	.4266	.0006	0.	0.	0.	N2 TANK -Z, LOWER
25	.0001	.0034	.0001	0.	0.	0.	N2 TANK, -Z, UPPER
26	0000	.0052	.0000	0000	.0000		CM, FWD BULKHEAD
27	2000	.0123	.0000	.0003	0000		CM, AFT BULKHEAD
28	.0001	.0001	.0000		.0300		SM, FWD BULKHEAD
29	.0001	.0006	.0000	.0000 .0001	.0000		SM, AFT BULKHEAD
30	.0007	.0001	.0049	0.	0.	0.	LONER D LATCH, DA
31	.0080	-0056	0000	0.	0.	0.	LOWER +Y TRUNNION
32	.0001	0001	.0002	0.	0.	0.	LOWER -Y TRUNNION
33	.0001	.0000	.0000	0.	0.	9.	EREP PACKAGE C.G.
34	. 1004	.0000	.0001	0.	0.	0.	ATH PN 6,7 IF, OUTR
35	0001	0000	.0039	0.		0.	ATH PN 4,5 IF, OUTR
35	.0007	.0000	0000	0.	0.	0.	ATM PN 8,1 IF, OUTR
37	•0002	.0002	.0003	0.	0.	0.	ATM PN 2,3 IF,OUTR
38	.0013	.0003	.0000	0.	0.	0.	ATM PN 6,7 IF, INNR
39	.0027	0002	.0015	0.	0.	0.	ATM PN 4,5 IF, INNR
40			.0000		0.		ATM PN 8,1 IF, INNR
41	•0034	•0030	.0001	_	0.		
42	•0005		.0014	· C 0 8 0		0.	ATM PN 2,3 IF, INNR
43	.0016	.0026			•0001	.0000	
		.0004	0000	0000	.0000	.0000	-
44 45	.0048 0000	.0002	.0000	.0001	.0004	.0000	
		0000	0 •	0.	0.	0.	ATH SAS ,PN 1
46	0000	0000	0.	0.	0.	0.	ATH SAS, PN 3
47	0000	0000	Û.	0.	0.	0.	ATH SAS, PN 5
48	.0000	.0000	D •	0.	0.	8•	ATM SAS, PN 7
49	•0079	.0016	.0000	.0072	-0154	0.	SPAR CENTER
50	.0126	.0084	.0000	.0092	.0188		GRAZCAN SENTER
01111	04.00	64.00					
SUM	.2402	.6422	.0511	.0207	.0344	.0113	

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TABLE C-39

ORBITAL CONFIGURATION MODAL SURVEY ANALYTICAL MODES GENERALIZED MASS CONTRIBUTION SUMMARY

ANALYTICAL MODE 65 ANALYTICAL FREQUENCY = 19.644 HZ.

COMPONENT	GMC	GMC	GMC	GMC	GMC	GMC
NAME	(DX)	(PY)	(DZ)	(TX)	(TY)	(TZ)
3P/OHS SKIRT/IU/FAS	.0001	.0257	.0081	.0161	.0000	.0030
5-FAS OZ TANKS	.2075	.0268	.0210	0.	0.	3.
MDA/STS/AM	.2092	.0005	. 0037	.0305	.0017	.0001
5-AM N2 TANKS	•1053	.0363	.0617	0.	0.	0.
COMMAND/SERVICE MOD.	.0584	.0002	.0015	.0361	.0004	.0031
DEPLOYMENT ASSEMBLY	0092	.0957	.0554	0.	0.	0.
ATM-PACK, CMGS, 4-SAS	.0014	.0427	.0024	.0375	.0004	.0003
ATM-SPAR CENTER	.0002	.0047	.0002	.0302	.0001	0.
ATM-GRAZCAN CENTER	.0000	.0093	.0001	.0302	.0001	.0031
SUM	.5729	.2419	. 1542	.0246	.0027	.0037

BR/OWS SKIRT/IJ/FAS	.0531
6-FAS 02 TANKS	.2553
MA/STS/ACM	.2157
6-AM N2 TANKS	. 2034
COMMAND/SERVICE MOD.	.0608
DEPLOYMENT ASSEMBLY	.1419
AT1-RACK, CMGS, 4-SAS	.0547
AT4-SPAR CENTER	.0053
AT4-GRA/CAN CENTER	.0099

C-43 TABLE C-40

GENERALIZED HASS CONTRIBUTIONS BY DEGREE OF FREEDOM

ANALYTICAL MODE 55 FREQUENCY= 19.64 4Z.

NODE	GMC	GMC	GMC (DZ)	GMC (TX)	GMC (TY)	GMC (TZ)	ACON NOITTINOSED
40.	(XQ)	(PY)	(02)	(1)	(11)	(12)	UESURIFIION
1	.0000	.0060	.0015	.0143	.0001		BASE RNG/OWS SKIRT
2	.0000	.0023	.0000	.0008	0000		OWS/IU INTERFACE
3	0005	.0064	.0000	.0010	0000		IU/FAS INTERFACE
4	.1374	.0013	.0018	0 •	0.	٥.	FAS 02 B3TL1,+Y +Z
5	.0303	.0002	.0027	8.	0.	0 •	FAS DE BOTLE, +Y +Z
5	.0049	.0007	.0048	0.	0.	0.	FAS 02 BOTL3,-Y +Z
7	0001	.0078	.0011	0.	0.	0.	FAS 02 BOTL4,-Y +Z
8	.3101	.0117	.0012	0.	0.	0 •	FAS 02 BOTL5,-Y -Z
9	.0249	.0051	•0094	0.	0 •	0.	FAS 02 BOTL6,-Y -Z
10	.0301	0002	.0022	θ.	0.	0.	FAS/AM/DA IF, +Y
11	.0002	.0007	0000	0 •	8.	0.	FAS/AM/DA IF, +Z
12	.0031	.0011	0001	0.	0.	0.	FAS/AM/DA IF, -Y
13	.0001	.0032	.0032	0 •	0.	0 •	FAS/DA IF, -Y -Z
14	.0011	.0062	• 0 0 0 4	0 •	0.	0 •	FAS/AM IF, -Z
15	0000	0001	.0007	0 •	0.	0.	FAS/DA IF, +Y -Z
15	.0243	.0001	• 0 0 0 7	.0001	.0000		AM TUNNE / SHEAR WB
17	• 9 4 5 2	.0001	.0008	.0001	.0001		AM TUNNE_/STS IF
18	.0743	.0003	•0022	.0002	.0002		MDA/STS INTERFACE
19	.0554	.0000	0000	.0002	.0314		MDA CONE/CYL ITRFC
20	.0324	.0003	.0003	0 •	8.	8.	N2 TANK, +Y, LOWER
21	.0027	•0000	0575	0 •	0.	0 •	N2 TANK, +Y, UPPER
22	• 3372	.000G	•0001	0.	0.	0.	N2 TANK, +Z, LOWER
23	.0038	.0112	.0000	0.	0.	0.	N2 TANK, +Z, UPPER
24	.0263	.0195	.0032	0.	0.	0.	N2 TANK -Z, LOWER
25	.0028	.0052	.0005	0.	0.	0.	N2 TANK, -Z, UPPER
26	.0001	.0000	•0005	.0050	.0001		CM, FWD BULKHEAD
27	.0058	.0001	.0010	.0000	.0003	0000	CM, AFT BULKHEAD
28	.0151	.0000	.0001	.0000	0000	.0000	SH, FWD BULKHEAD
29	. 9 35 4	.0001	.0000	.0000	.0000		SM, AFT BULKHEAD
30	.0010	0263	.0017	0 •	0.	0.	LOHER D _ATC4, DA
31	0052	•0 66 9	.0244	0 •	0.	0.	LOWER +Y TRUNNION
32	0050	.0551	.0292	.0.	0.	0.	LOWER -Y TRUNNION
33	.0001	.0000	.0000	0.	0.	0.	EREP PACKAGE C.G.
34	.0000	.0017	0000	0 •	0.	0.	ATH PN 6,7 IF, OUTR
35	.0003	.0008	.0010	0.	0.	0.	ATM PN 4,5 IF, OUTR
36	0001	.0008	.0001	0.	0.	0.	ATM PN 8,1 IF, OUTR
37	.0001 0005	.0003	.8000	0.	0.	8•	ATM PN 2,3 IF,OUTR
38 39	.0001	.0084 .0040	.0001	0 • 0 •	0 • 0 •	0 • 0 •	ATM PN 6,7 IF, INNR ATM PN 4,5 IF, INNR
40	•0000	.0007	,0001	0.	0.	0.	ATM PN 8,1 IF, INNR
					_		ATM PN 2,3 IF, INNR
41 42	.0007 0000	.0054 .0167	0000 -0004	0. .0073	.0001	•0002	
43	•0000	.0029	.0001	.0000	.0001	.0002	CMG, +Y SIDE
44	.0007	.0010	.0000	.0001	.0002	.0002	*
45	.0000	.0000	0.	0.	0.	0.	ATM SAS ,PN 1
46	0000	0000	0.	0.	0.	0.	ATH SAS, PN 3
47	0000	0000	0.	0.	0.	0.	ATH SAS, PN 5
48	.0000	.7000	0.	0.	0.	0.	ATM SAS, PN 7
49	.0002	.0047	.0002	.0002	.0001	0.	SPAR CENTER
50	.0000	.0093	.0001	.0002	.0001		GRAZCAN SENTER
SUM	.5729	.2419	. 1542	.0246	.0027	.0037	

SECTION D

Two-Dimensional Plots of Analytical Modes

D-2

ORBITAL CONFIGURATION MODAL SURVEY
DEGREE OF FREEDOM TABLE FOR MODE SHAPES AND DISCRETE MASS MATRIX

NODE		DEGR	EES OF	FRE	ED OM			LOCATION		
NO.	DΧ	DY	DZ	TX	TY	TZ	X	Y	Z	DESCRIPTION
1	1	2	3	4	5	6	3100.00	0.000	0.000	BASE RNG/ONS SKIRT
?	7	8	9	10	11	12	3223.000	0.000	0.000	OMS/IU INTERFACE
3	13	14	15	16	17	18	3258.555	0.000		IU/FAS INTERFACE
4	19	20	21				3316.555	81.473		FAS 02 BOTL1,+Y +Z
5	22	23	24				3316.555	46.683	81 • 473	FAS 02 BOTL2,+Y +Z
6	25	25	27				3316.555	-45.6 83		FAS 02 BOTL3,-Y +Z
7	28	29	30				3316.555	-81.473		FAS 02 BOTL4,-Y +Z
8	31	32	33				3316.555	-81.473		FAS 02 BOTL5,-Y -Z
9	34	35	36				3316.555	-46.683		FAS 02 BOTL6,-Y -Z
10	37	38	39				3341.615	116.050		FAS/AM/DA IF, +Y
11	40	41	42				3341.615	0.000		FAS/AM/DA IF, +Z
17	43	44	45				3341.615	-116.060		FAS/AM/DA IF, -Y
17	46	47	48				3355.700	-82.346	-81.488	FAS/DA IF, -Y -Z
14	49	511	51				3341.615			FAS/AM IF, -Z
15	52	53	54				3341.615			S FAS/DA IF, +Y -Z
16	55	56	57	58	59	60	3282.365	0.000		AM TUNNEL/SHEAR WB
17	51	62	63	64	65	66	3394.615	0.000		AM TUNNEL/STS IF
18	67	68	69	70	71	72	3441.765	0.000		MDA/STS INTERFACE
19	73	74	75	76	77	78	3505.000	0.000		MDA CONE/CYL ITRFC
5 Ú	79	81	81				3297.565	69.050		N2 TANK, +Y, LOWER
21	82	83	84				3348.365	69.050		N2 TANK, +Y, UPPER
22	85	85	87				3297.665	0.000		N2 TANK, +Z, LOWER
23	88	89	90				3348.365 3297.665	0.000 0.000		N2 TANK, +Z, UPPER N2 TANK -Z, LOWER
24	91	92 95	93				3348.365	0.000		N2 TANK -Z, LOWER N2 TANK, -Z, UPPER
25	94 97	98	96 99	100	101	102	3578.880	0.000		CH, FWD BULKHEAD
26	-	194		106	107	108	3751.600	0.000		CM, AFT BULKHEAD
27 28		110		112	113	114	3766.500	0.000		SM, FWD BULKHEAD
29		116		118	119	120	3921.500	0.000		SM, AFT BULKHEAD
30		122	123	110	• • •	1-0	3454.765	0.000		LOWER D LATCH, DA
31		125	126				3532.915	113.500		LOWER +Y TRUNNION
32		128	129				3532.915			LOWER -Y TRUNNION
33		131	132				3418.765	0.000		EREP PACKAGE C.G.
34		134	135				3479.094			ATH PN 6,7 IF, OUTR
35		137	138				3517.701			ATH PN 4,5 IF, OUTR
36		140	141				3572.299			ATH PN 8,1 IF, OUTR
37		143	144				3510.906			ATM PN 2,3 IF, OUTR
38		146	147				3479.094			ATH PN 6,7 IF, INNR
39		149	150				3517.701	-65.906	-153.000	ATM PN 4,5 IF, INNR
40		152	153				3572.299	65.906	-158.000	ATH PN 8,1 IF, INNR
41		155	156				3510.906	-27.299	-153.000	ATM PN 2,3 IF, INNR
42	157	158	159	160	161	162	3545.000	-65.986	-181.992	5 CMG, -Y SIDE
43	163	164		166	167	168	3545.000		-181.995	CHG, +Y SIDE
44		170	171	172	173	174	3510.906		-182.000	CMG, +X SIDE
45		176					3599.930		-207.490	ATH SAS ,PN 1
	177	178						1 -54.9301		ATH SAS, PN 3
47		180						9 -54.9301		ATH SAS, PN 5
48		187					3490.069		-207.490	ATH SAS, PN 7
49		184		186	187	4.5 =	3545.000			SPAR CENTER
50	188	189	190	191	192	193	3545.000	0.000	-240.709	GRA/CAN CENTER

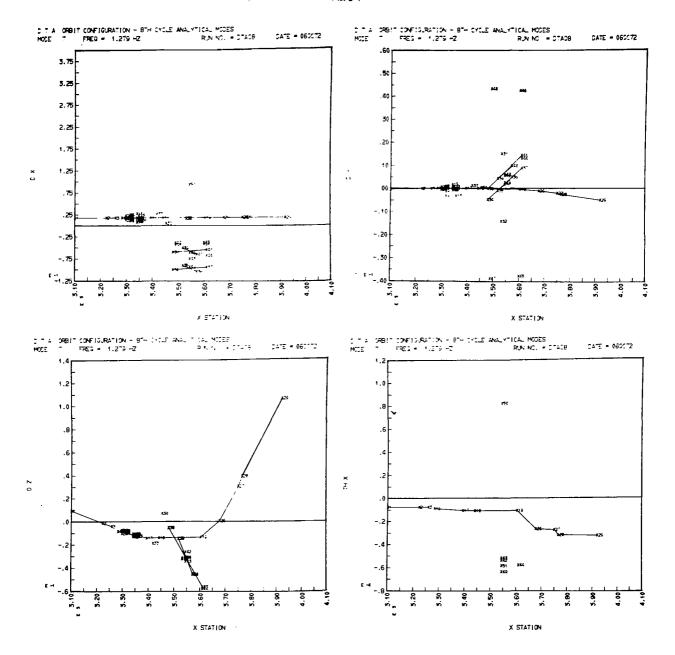
7

Two dimensional plots of the correlated analytical modes as defined in Table 5.17 of the main text are presented in this section. The plots are presented in the same manner as the test mode plots contained in Section A with the following exceptions:

- 1. Analytical modes are plotted correctly between node ${\bf 3}$ and node ${\bf 16}$.
- 2. Node 50 is plotted with the incorrect sign in the X, Y, $TH \ X$, and $TH \ Y$ planes.

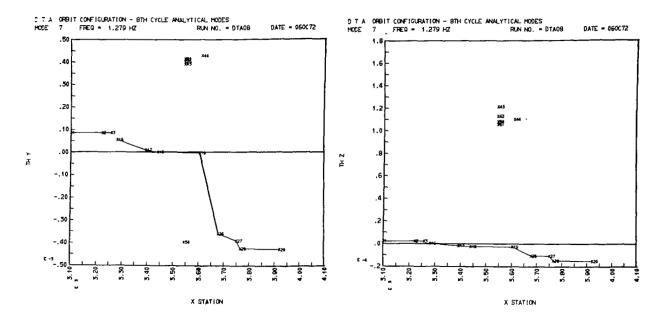
The plotted node points and associated degrees of freedom are defined on page D-2 of this section.

Plot D-I

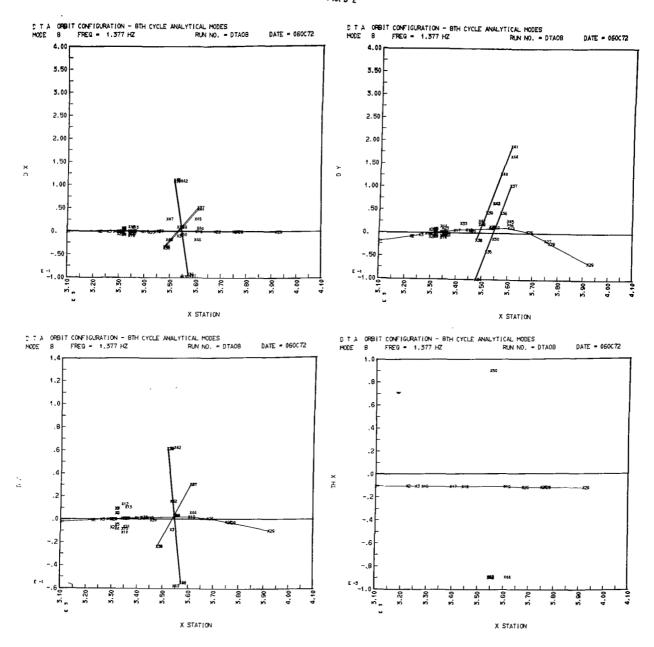


1200

Plot D-I

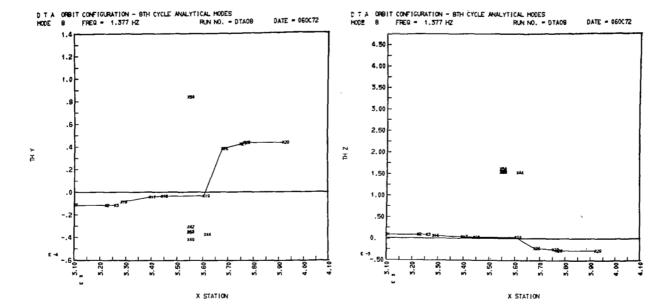


Plot D-2

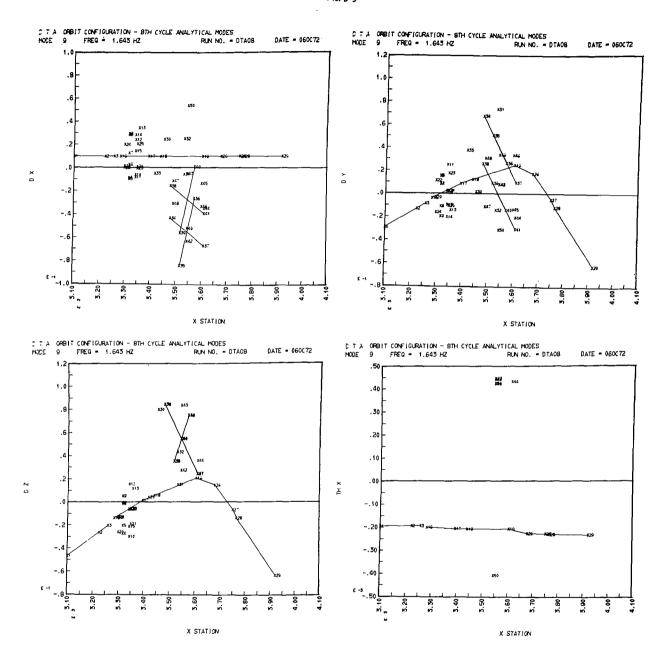


10

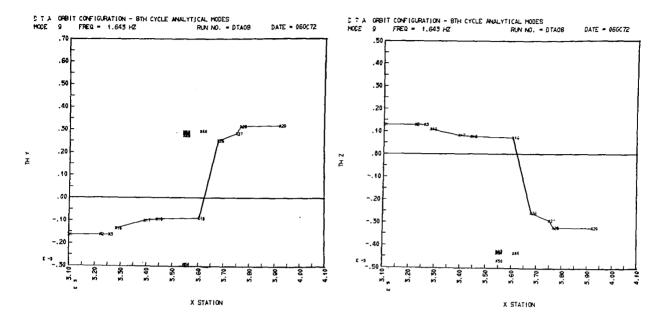
Plot D-2



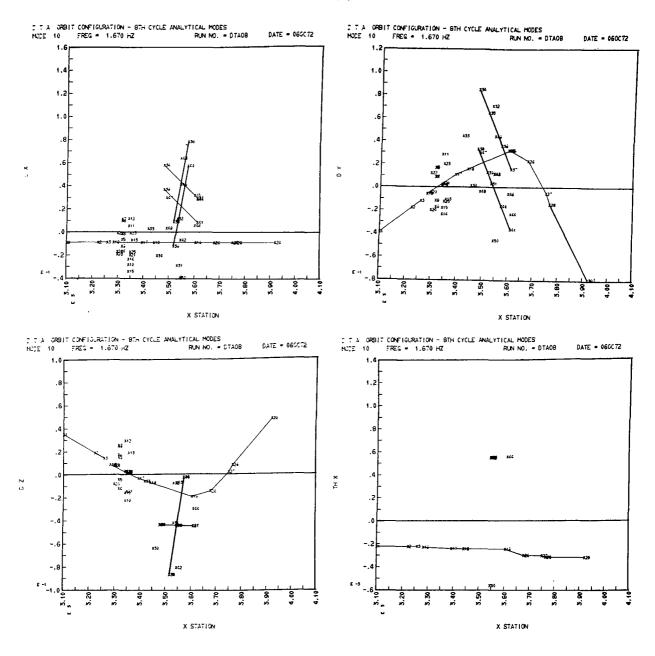
Piot D-3



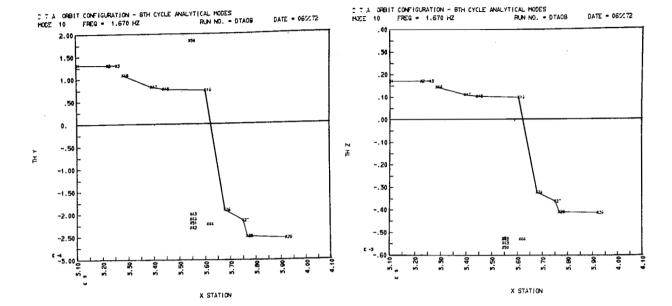
Piot D-3



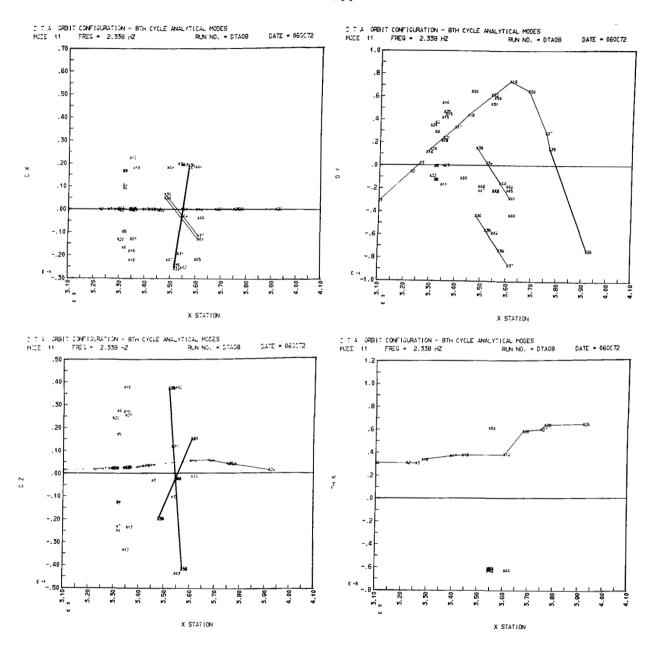
Plot D-4



Plot D-4

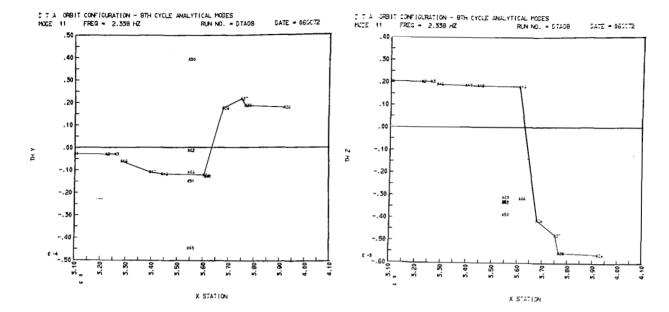


Plot D-5

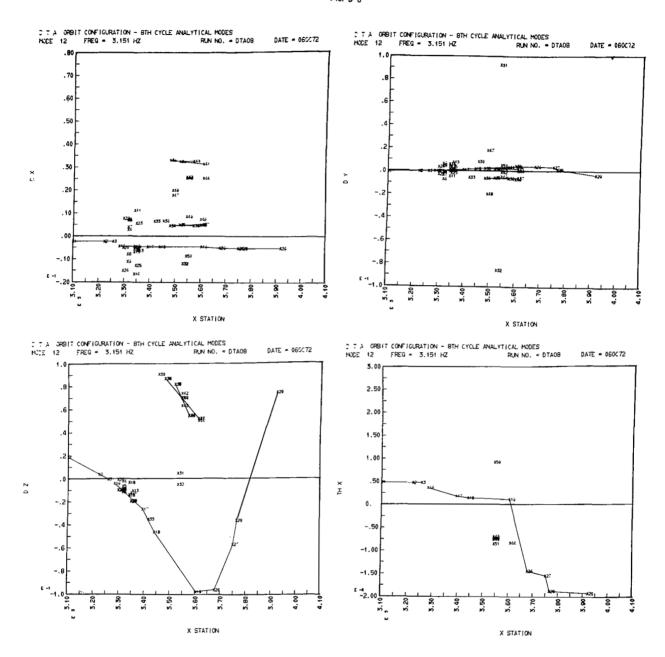


£

.Plot D-5

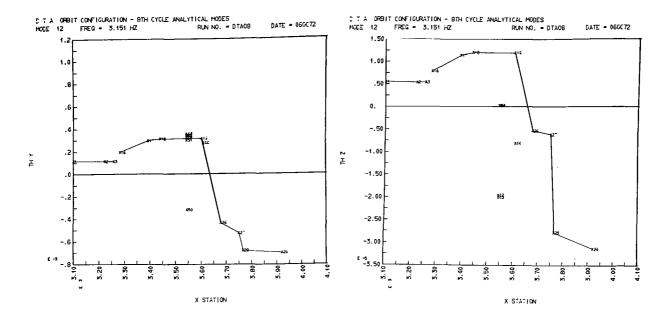


Plot D-6

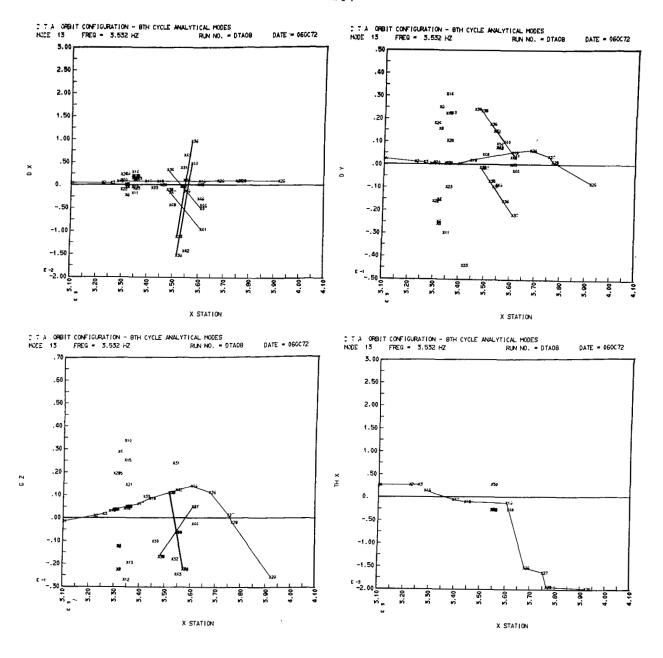


3

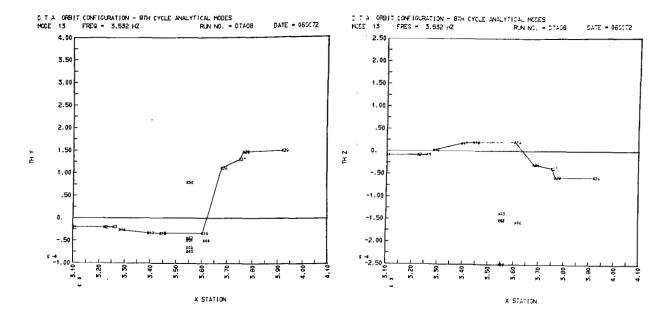
Plot D-6



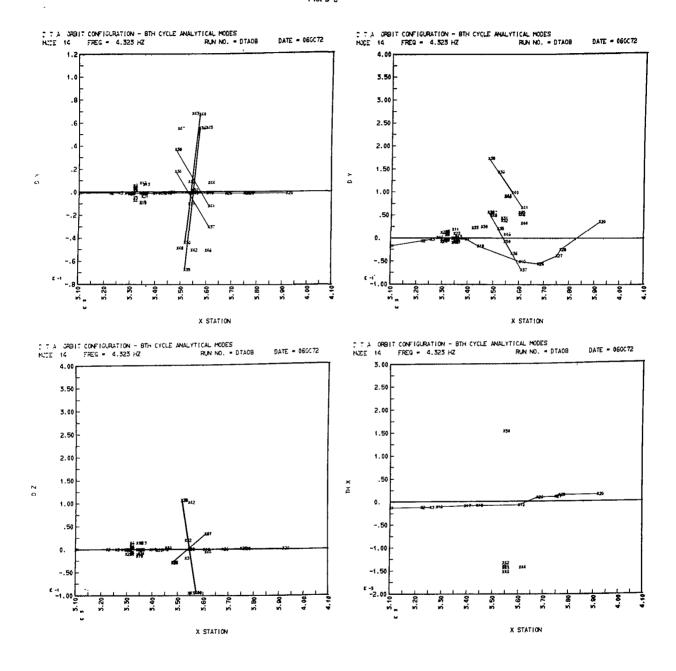
Plot D-7



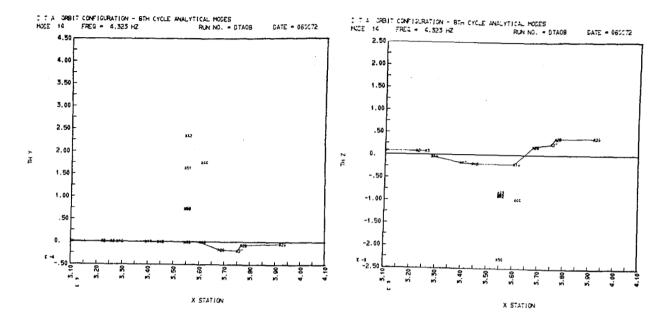
Plot D-7



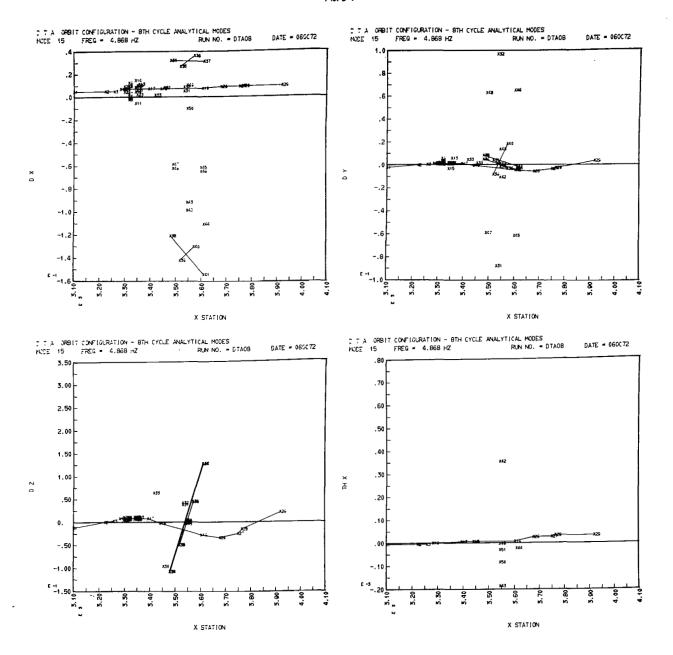
Plot D-8



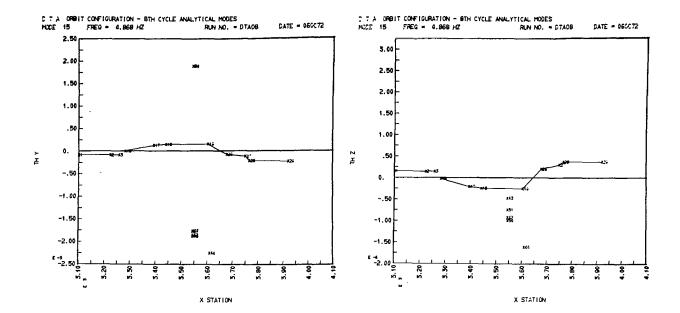
Plot D-8



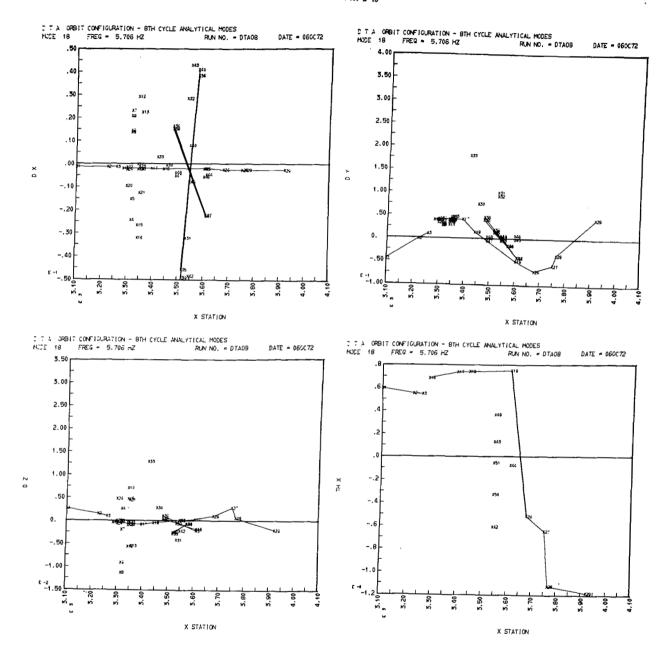
Plot D-9



Plot D-9

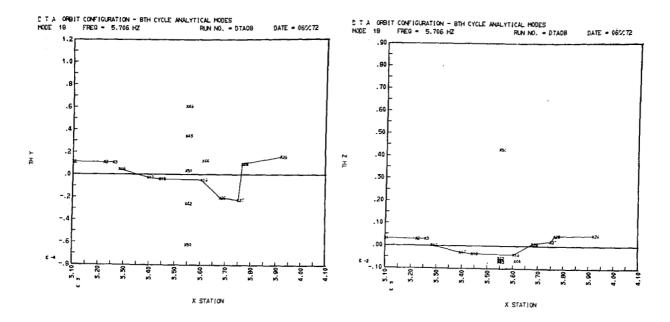


Plot D-IO

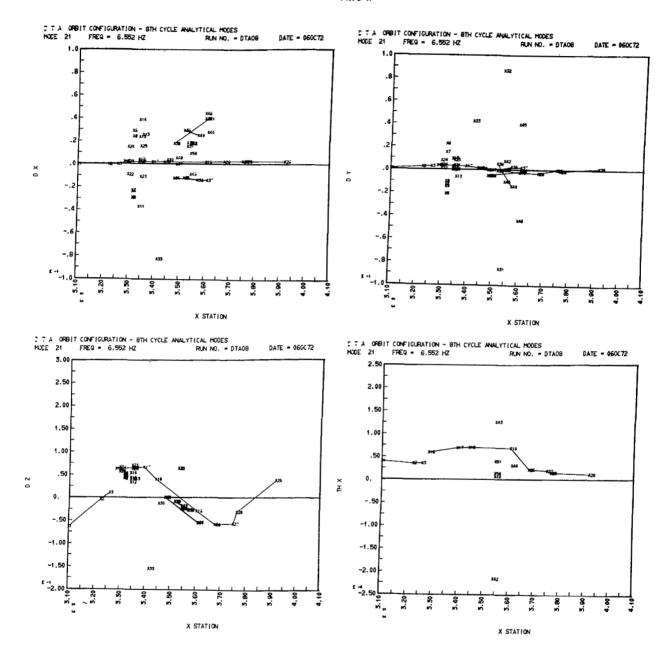


17

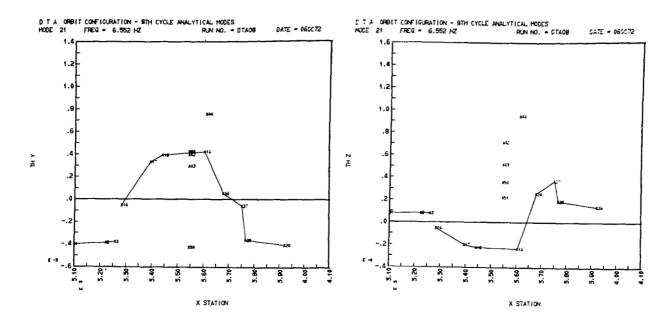
Plot D-10



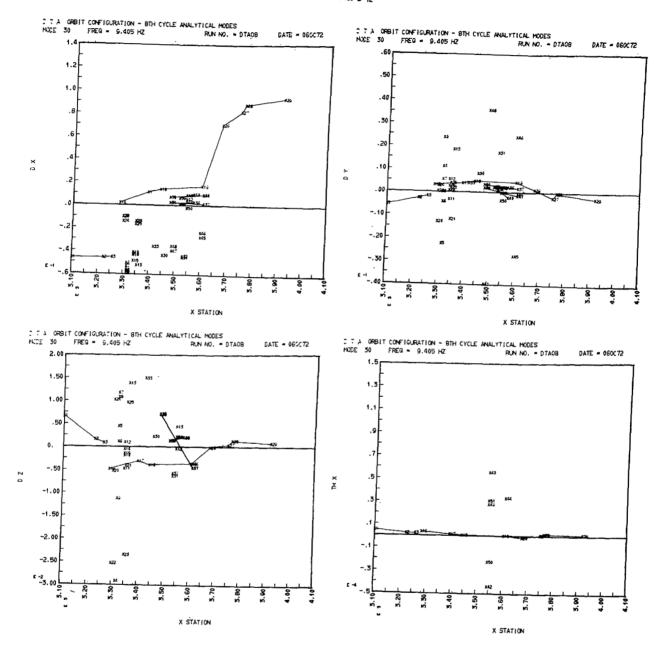
Piot D-II



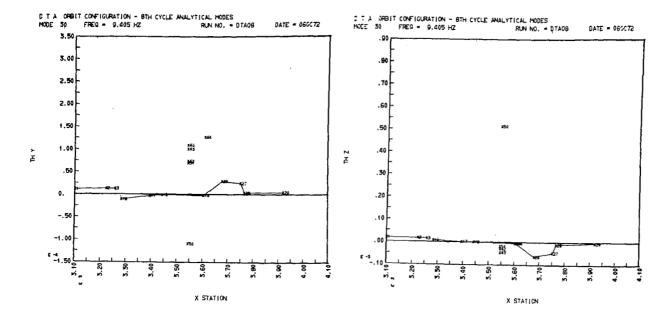
Plot D-II



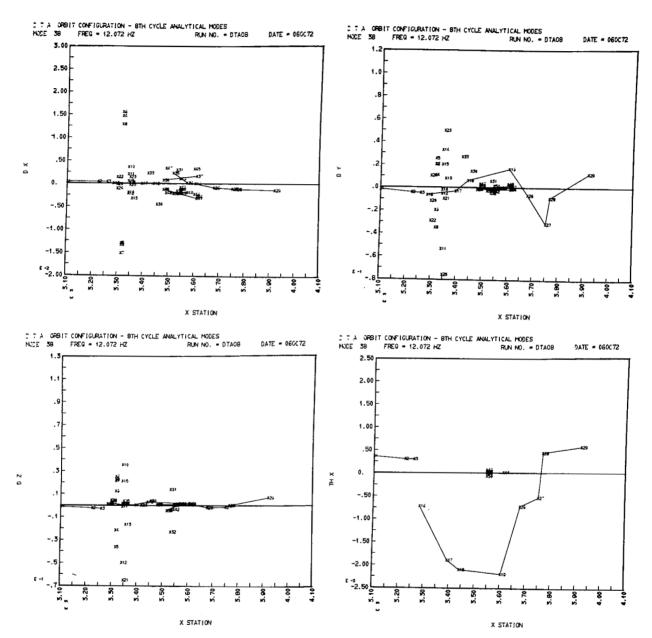
Plot D-12



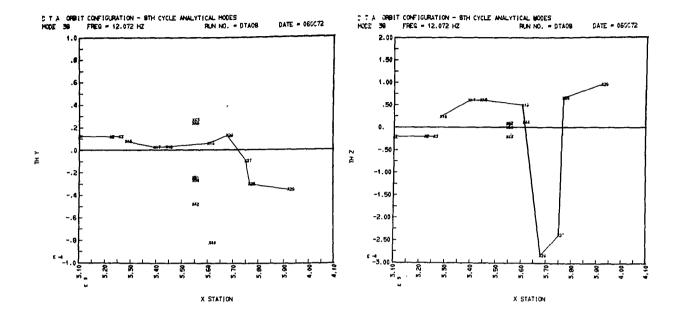
Plot D-I2



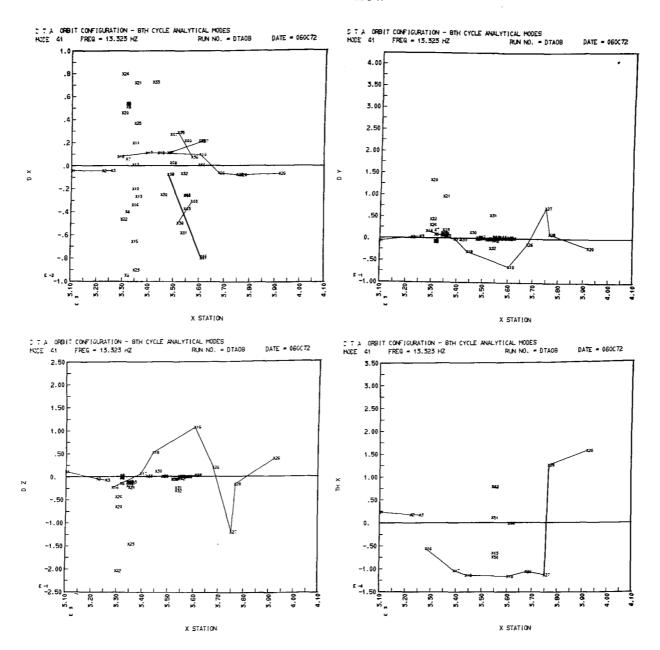
Plot D-I3



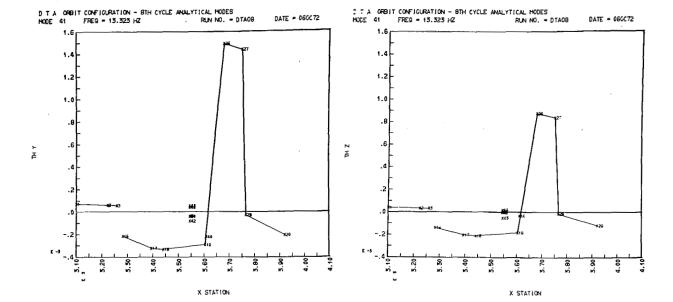
Plot D-13



Plot D-I4

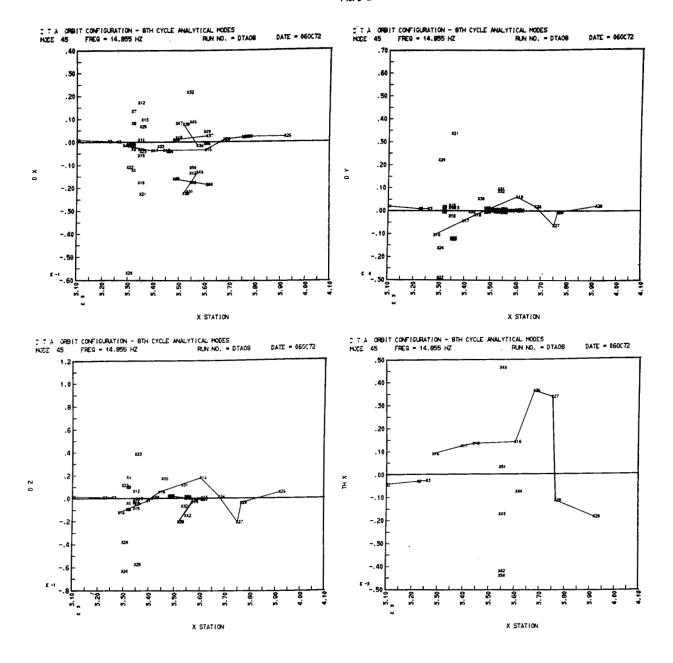


Piot D-14

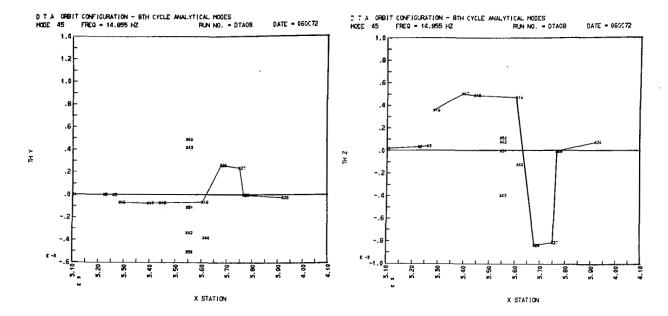


ı

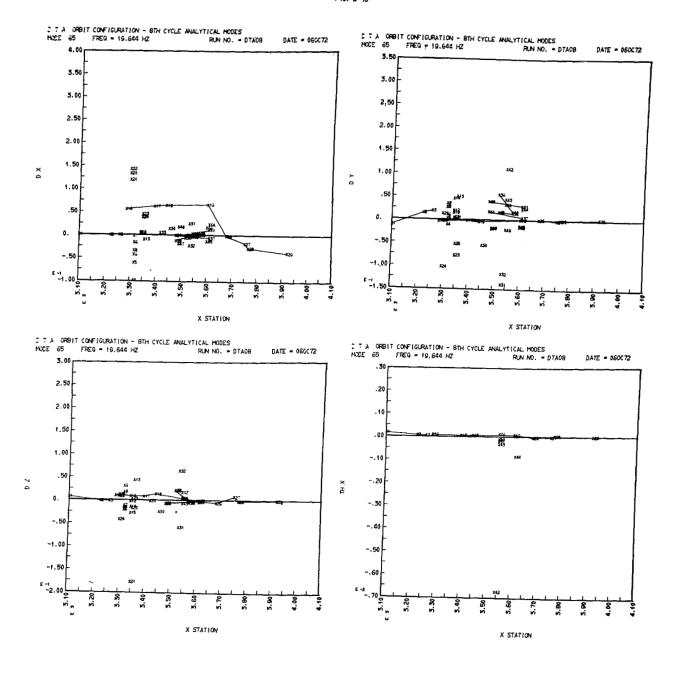
Plot D-15



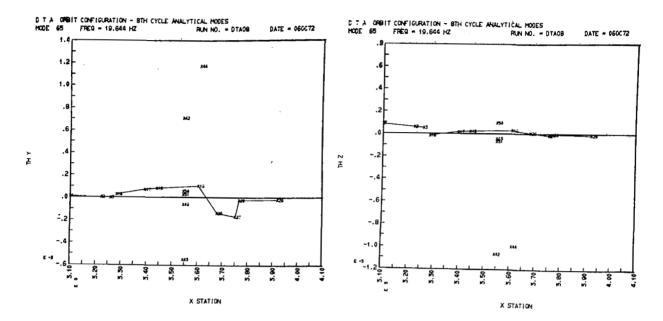
Plot D-15



Plot D-16



Plot D-16



Section E

UNCOUPLED MODES FLIGHT CONFIGURATION 1.2

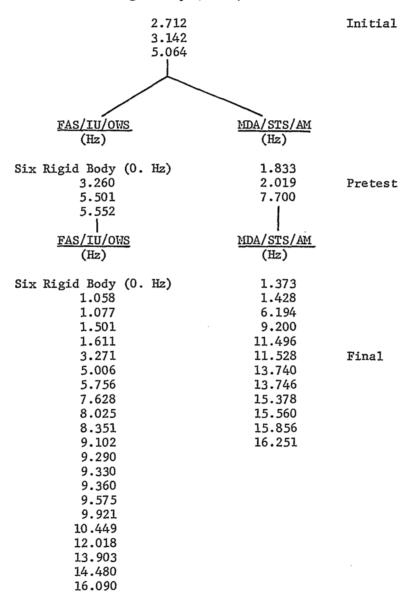
In this section (E-1 through E-7) the Skylab uncoupled component modal data are presented in terms of frequency data. The data are arranged according to three model development cycles; initial, pretest and final. During the development of the model, major subcomponents were subdivided according to areas of major concern. This evolution of model components is depicted where applicable.

Uncoupled Modes Flight Configuration 1.2

Main (OWS/IU/FAS/AM/STS/MDA) Modes

(Hz)

Six Rigid Body (0. Hz)



```
ATM (ATM Rack, GRA,
                           Spar/Canister, DA) Modes
                           (Hz)
                            .821
                           1.163
                           1.242
                           1.362
                           1.395
                           2.595
                                                             Initial
                           2.774
                           3.166
                           3.526
                           3.664
                           4.709
                           4.866
                           4.987
ATM/DA (ATM Rack, GRA, Spar/Canister, DA (Depl.)) Modes
                           (Hz)
                            .868
                           1.126
                           1.252
                           1.408
                           1.573
                           2.689
                           2.839
                                                             Pretest
                           3.276
                           3.306
                           3.503
                           3.889
                           4.501
                           4.878
                           5.512
                           5.782
                  Rack (OL)
                                               Canister
                                 Spar/GRA
  DA (Depl.)
     (Hz)
                     (Hz)
                                    (Hz)
                                                  (Hz)
      .569
                    2.900
                                    1.069
                                                 6.120
     1.081
                    3.057
                                    1.182
                                                 7.197
     1.108
                    3.284
                                    4.320
                                                 9.385
                                                 10.578
                                                             Final
     2.516
                    3.344
                                    5.339
                                                 10.578
     2.704
                                    5.556
                    3.835
                                                 14.058
     3,236
                    4.255
                                    6.171
                                   6.749
                                                 14.492
     5.550
                    5.063
     6.443
                    5.120
                                  13.294
                                                 15.448
                                  18.739
    10,675
                    6.496
    12.535
                    7.033
    16.815
                    9.700
                   10.557
                   11.306
                   11.928
                   13.369
```

15.265

Uncoupled Modes Flight Configuration 1.2

Farside (+Y) OWS Solar Array Modes (OWSFS)

Initial (Hz)	Pretest (Hz)	Final (Hz)
		13.540 13.730
		13.828 16.926

Uncoupled Modes Flight Configuration 1.2

Nearside (-Y) OWS Solar Array Modes (OWSNS)

Initial	Pretest	Final
(Hz)	(Hz)	(Hz)
.349	.465	.385
.475	.561	.447
.489	.733	.458
•557	.759	.530
.934	1.059	. 909
1.298	1.064	.910
1.301	1.065	.910
1.323	1.276	1.985
2.539	2.307	2.280
2.566	3.590	2.567
2.621	4.054	2.598
3.229	4.246	2.948
3.996	4.347	3.083
4.421	4.650	3.209
4.436	4.654	3.210
4.483	4.663	3.226
5.353	4.815	3.722
6.061	9.047	6.102
6.175		6.471
6.209		8.675
		9.317
		13.569
		13.720
		13.833
		17.679

15-

Uncoupled Modes Flight Configuration 1.2

Axial-Docked CSM Modes

Initial (Hz)	Pretest (Hz)	Final (Hz)
1.089 1.117 2.956 5.624 6.523	1.050 1.068 2.952 5.623	1.050 1.069 3.662 5.623 6.520 9.037 9.637 10.627 10.998 14.322
• • • • •	5.623	6.52 9.03 9.63 10.62 10.99

ATM Solar Array Modes Forward Farside (Bay 1)

.206	.200	.184
.740	.607	.558
.987	.727	.663
1.839	.957	.893
2.368	1.424	1.336
2.546	2.314	2.037
3.371	2.627	2.532
3.964	3.326	3.065
4.713	3.704	3.372
5.490	4.639	4.034
5.792	4.911	4.715
6.862	6.631	6.097
		8.674
		9.149
		9.365
		9.879
		11.057
		12.903
		15.762

ATM Solar Array modes for:

forward nearside (Bay 3) aft nearside (Bay 5) aft farside (Bay 7)

Same as modes for forward farside (Bay 1)

Section F

COUPLED MODES FLIGHT CONFIGURATION 1.2

The following table shows the coupled modes for the analytical model of flight configuration 1.2. These modes are presented for three model phases; initial, pretest and final. For each model phase, the mode number, major contribution and coupled frequency are presented. A frequency cutoff of 15 Hz was used in order to stay within computer size limitations.

Coupled Modes Flight Configuration 1.2

	Initial			Pretest			Final	
Mode	Major Contributor	Coupled Frequency	Mode	Major Contributor	Coupled Frequency	Mode	Major Çontributor	Coupled Frequency
1	Main l	0.	1	FAS/IU/OWS 1	0.	1	FAS/IU/OWS 1	0.
2 .	Main 3	0.	2	FAS/IU/OWS 2	·	2	FAS/IU/OWS 2	0.
3	Main 3	0.	3	FAS/IU/OWS 3	0.	3	FAS/IU/OWS 3	0.
4	Main 4	0.	4	FAS/IU/OWS 4	0.	4	FAS/IU/OWS 4	0.
5	Main 5	0.	5	FAS/IU/OWS 5	0.	5	FAS/IU/OWS 5	0.
6	Main 2	0.	6	FAS/IU/OWS 6	0.	6	FAS/IU/OWS 6	0.
7	SP5-1	.206	7	ATMSA5 1	.200	7	ATM/SA5-1	.183
8	SP7-1	.206	8	ATMSA7 1	.200	8	ATM/SA7-1	.183
9	SP3-1	.207	9	ATMSA3 1	.202	9	ATM/SA3-1	.185
10	SP7-1	.211	10	ATMSA1 1	.205	10	ATM/SA1-1	.188
11	OWSNS1	•353	11	OWSFS1	.465	11	OWSFS1	.377
12	OWSFS1	.369	12	OWSNS1	.479	12	OWSNS1	.385
13	OWSNS2	.475	13	OWSNS2	.570	13	OWSFS2	.444
14	OWSFS2	.476	14	OWSFS2	.575	14	OWSNS2	•445
15	OWSNS3	.489	15	ATMSA5-2	.607	15	OWSFS3	.458
16	OWSFS3	.489	16	ATMSA7-2	.607	16	OWSNS3	.458
17	OWSFS4	.561	17	ATMSA3-2	.607	17	OWSFS4	.499
18	owsns4	.566	18	ATMSA1-2	.608	18	owsns4	. 50 5
19	SP7-2	.739	19	ATMSA5-3	.725	19	ATM/SA3-2	.553
20	SP1-2	.740	20	ATMSA1-3	.725	20	ATM/SA5-2	.557
21	SP5-2	.740	21	ATMSA7-3	.725	21	ATM/SA7-2	.557
22	SP3-2	.740	22	ATMSA7-3	.727	22	ATM/SA1-2	.558
23	ATM-1	.839	23	OWSNS3	.733	23	DA (DEPL) 1	.595
24	SP5 - 3	.884	24	OWSFS3	.734	24	ATM/SA5-3	.660
25	SP7-3	.886	25	OWSFS	.760	25	ATM/SA5-3	.661
26	SP1-3	.887	26	OWSNS	.760	26	ATM/SA7-3	.661
27	SP7-3	.889	27	ATM/DA-1	.880	27	ATM/SA1-3	.662
28	OWSFS5	.957	28	ATMSA5-4	.954	28	ATM/SA5-4	.888
29	OWSNS5	.977	29	ATMSA1-4	.956	29	ATM/SA3-4	.892
30	ATM-2	1.175	30	ATMSA3-4	.956	30	ATM/SA7-4	.892
31	CSM-1	1.271	31	ATMSA3-4	.962	31	ATM/SA1-4	.892
32	OWSFS6	1.298	32	OWSNS5	1.059	32	OWSFS5	.907
33	owsns6	1.298	33	OWSFS5	1.060	33	OWSNS5	.907
34	OWSFS7	1.301	34	owsns6	1.064	34	OWSFS6	.910
35	OWSNS7	1.301	35	OWSFS6	1.064	35	owsns6	.910
36	OWSNS8	1.320	36	OWSNS7	1.065	36	OWSNS7	.910
37	OWSFS8	1.323	37	OWSFS7	1.065	37	OWSFS7	.910
38	ATM- 5	1.335	38	ATM/DA 2	1.129	38	SPAR/GRA1	1.034
39	CSM-2	1.404	39	CSMAX-1	1.222	39	CSMAX-2	1.109
40	ATM-4	1.568	40	CSMAX-1	1.243	40	CSMAX-1	1.142
41	SP1-4	1.829	41	OWSFS8	1.285	41	SPAR/GRA2	1.142
42	SP5-4 *	1.837	42	ATM/DA-3	1.309	42	DA(DEPL)2	1.275

43 8 44 8 45 A	Major Contributor SP1-4	Coupled Frequency	[
43 8 44 8 45 A		Frequency	ı	Major	Coupled		Major	Coup-led
44 8 45 <i>1</i>	SD1/-		Mode	Contributor	Frequency	Mode	Contributor	Frequency
44 8 45 <i>1</i>	CD1~/							
45		1.838	43	CSMAX-2	1.403	43	FAS/IU/OWS7	1.283
	SP5-4	1.845	44	ATMSA5-5	1.415	44	ATM/SA7-5	1.331
46	ATM-3	2.266	45	ATMSA7-5	1.423	45	ATM/SA7-5	1.335
	SP5-5	2.367	46	ATMSA3-5	1.424	46	ATM/SA1-5	1.339
	SP1-5	2.368	47	ATMSA1-5	1.428	47	ATM/SA5-5	1.355
	SP3-5	2.369	48	ATM/DA-4	1.569	48	FAS/IU/OWS8	1.389
	SP7-5	2.373	49	ATMSA5-6	2.276	49	DA (DEPL) 3	1.956
	owsns9	2.539	50	OWSFS9	2.283	50	ATM/SA5-6	2.062
	OWSFS9	2.540	51	ATMSA5-6	2.302	51	ATM/SA5-6	2.077
	SP5-6	2.545	52	ATMSA1-6	2.302	52	ATM/SA7-6	2.078
	SP3-6	2.546	53	OWSNS9	2.305	53	ATM/SA1-6	2.082
	SP7-6	2.546	54	ATMSA1-6	2.315	54	OWSFS9	2.205
	SP3-6	2.546	55	ATM/DA 5	2.425	55	OWSNS9	2.236
	OWSNS10	2.567	56	ATM/DA 10	2.513	56	RACK(OL)4	2.314
	OWSFS10	2.568	57	ATMSA5-7	2.616	57	ATM/SA5-7	2.505
	OWSNS11	2.621	58	ATMSA7-7	2.621	58	ATM/SA7-7	2.511
	OWSFS11	2.622	59	ATMSA3-7	2.627	59	ATM/SA3-7	2.521
	CSM-3	3.078	60	ATMSA7-7	2.634	60	ATM/SA7-7	2.526
	OWSNS12	3.214	61	CSMAX-3	2.973	61	OWSNS10	2.560
	OWSFS12	3.231	62	CSMAX-3	2.982	62	OWSFS10	2.565
	OWSNS12	3.238	63	ATMSA7-8	3.055	63	OWSFS11	2.597
	SP5-7	3.349	64	ATM/DA 9	3.520	64	OWSNS11	2.597
	SP1-7	3.357	65	OWSFS10	3.582	65	OWSNS13	2.644
	SP3-7	3.366	66	OWSNS10	3.590	66	OWSFS13	2.657
	SP3-7	3.371	67	ATMSA5-9	3.662	67	ATM/SA3-8	2.793
	ATM-10	3.523	68	ATMSA3-9	3.679	68	ATM/SA1-8	2.824
	ATM-8	3.694	69	ATMSA1-9	3.690	69	DA (DEPL) 5	2.946
	SP3-8	3.959	70	ATMSA3-9	3.698	70	OWSFS12	2.992
	SP5-8	3.968	71	ATM/DA 11	3.921	71	OWSNS12	2.993
	SP3-8	3.970	72	OWSNS11	4.054	72	OWSNS14	3.208
	SP1-8	3.974	73	OWSFS11	4.058	73	OWSFS14	3.208
	OWSFS13	3.996	74	OWSFS12	4.247	74	OWSNS15	3.210
	OWSNS13	3.996	75	OWSNS12	4.251	75	OWSFS15	3.210
	ATM-11	4.264	76	OWSFS13	4.347	76	OWSFS16	3.213
	OWSFS14	4.422	77	OWSNS13	4.348	77	OWSNS16	3.213
	OWSNS14	4.423	78	ATMSA7-10	4.638	78	ATM/SA5-9	3.333
	OWSNS15	4.436	79	ATMSA5-10	4.638	79	ATM/SA3-9	3.352
	OWSFS15	4.436	80	ATMSA1-10	4.639	80	ATM/SA1-9	3.356
	WSFS16	4.483	81	ATMSA3-10	4.639	81	ATM/SA1-9	3.360
	DWSNS16	4.483	82	OWSFS14	4.650	82	CSMAX-3	3.432
	SP5-9	5.064	83	OWSNS14	4.650	83	OWSFS17	3.621
	OWSFS17	5.363	84	OWSFS15	4.654	84	OWSNS17	3.682
	DWSNS17	5.382	85	OWSNS15	4.654	85	DA (DEPL) 4	3.902
	SP3-10	5.456	86	OWSNS16	4.663	86	ATM/SA3-10	4.033
	SP5-10	5.481	87	OWSFS16	4.664	87	ATM/SA5-10	4.033
88 S	SP1-10	5.485	88	OWSFS17	4.783	88	ATM/SA1-10	4.034

						r		· ····
	Initial	•		Pretest			Final	
	Major	Coupled		Major	Coupled		Major	Coupled
Mode	Contributor	Frequency	Mode	Contributor	Frequency	Mode	Contributor	Frequency
89	SP1-10	5.486	89	OWSNS17	4.834	89	ATM/SA7-10	4.034
90	ATM-11	5.568	90	ATMSA7 11	4.883	90	MDA/STS/AM-1	4.575
91	CSM-4	5.612	91	ATMSA5 11	4.900	91	MDA/STS/AM-2	4.641
92	SP5-11	5.677	92	ATMSA3 11	4.908	92	ATM/SA3-11	4.685
93	SP3-11	5.778	93	ATMSA1 11	4.911	93	ATM/SA3-11	4.696
94	SP1-11	5.787	94	ATM/DA 13	5.114	94	ATM/SA1-11	4.700
95	SP5-11	5.815	95	CSMAX4	5.609	95	ATM/SA5-11	4.777
96	SP7-11	5.959	96	ATM/DA 6	5.707	96	SPAR/GRA5	4.916
97	OWSNS18	6.061	97	MDA/STS/AM-1	6.380	97	SPAR/GRA3	5.155
98	OWSFS18	6.061	98	ATMSA7-12	6.631	98	DA(DEPL)7	5.525
99	OWSFS19	6.175	99	ATMSA7-12	6.631	99	DA(DEPL)7	5.602
100	OWSNS19	6.176	100 101	ATMSA3-12 ATMSA1-12	6.631	100	CSMAX-4	5.642
101 102	OWSFS20 OWSNS20	6.209 6.210	101	MDA/STS/AM-2	6.631 7.244	101 102	DA(DEPL)6 OWSNS18	6.045 6.092
102	Main 7	6.350	102	ATM/DA-7	8.374	102	ATM/SA7-12	6.097
103	CSM5	6.455	103	OWSFS18	8.631	103	ATM/SA1-12	6.097
104	SP7-12	6.862	105	OWSNS18	9.060	105	ATM/SAT-12	6.097
106	SP7-12	6.862	106	ATM/DA-6	10.813	106	ATM/SA1-12	6.097
107	SP3-12	6.862	107	ATM/DA-12	12.038	107	OWSFS18	6.123
108	SP1-12	6.862	108	MDA/STS/AM-3	12.894	108	SPAR/GRA6	6.280
109	Main 8	7.012	200	12011, 010, 121 3	121054	109	CANISTER1	6.407
110	ATM-7	8.364				110	DA (DEPL) 8	6.446
111	SP3-9	11.847				111	OWSFS19	6.463
112	ATM-13	12.667				112	OWSNS19	6.465
						113	CSMAX-5	6.551
			ł			114	SPAR/GRA-7	6.967
1]			115	OWSFS24	7.379
-						116	OWSNS24	7.690
						117	CANISTER2	7.894
1			1			118	8-EAR\MTA	8.258
1	Frequenc	v	ļ	Frequency	,	119	ATM/SA3-17	8.672
	Cutoff 15		l	Cutoff 15 H		120	ATM/SA7-17	8.675
1			!	041011 10 1	_	121	ATM/SA5-17	8.675
1]			122	ATM/SA3-17	8.717
			1			123	MDA/STS/AM-4	8.792
}			l			124	FAS/IU/OWS16	8.831
						125	FAS/IU/OWS18	9.082
			1			126	ATM/SA5-20	9.148
			1			127	ATM/SA1-20	9.148
			1			128	ATM/SA3-20	9.149
			1			129 130	ATM/SA7-20 FAS/IU/OWS17	9.152
1			İ			130	PAS/10/OWS1/ OWSNS25	9.177
1			1			132	OWSNS25 ATM/SA5-21	9.293 9.363
1						133	ATM/SA7-21	9.365
			1			133	TILL OW - 71	9.303
1			1			}		
<u> </u>	,						····	

	Final	
	Major	Coupled
Mode	Contributor	Frequency
134	ATM/SA1-21	0 267
134	ATM/SA3-21	9.367
136	CANISTER-3	9.368 9.497
137	OWSFS25	9.551
138	FAS/IU/OWS22	9.563
139	CANISTER4	9.661
140	FAS/IU/OWS21	9.668
141	FAS/IU/OWS23	9.827
142	ATM/SA5-22	9.871
143	ATM/SA1-22	9.874
144	ATM/SA7-22	9.874
145	ATM/SA3-22	9.882
146	DA(DEPL)9	10.406
147	CANISTER5	10.608
148	CSMAX-9	10.628
149	ATM/SA3-25	11.057
150	ATM/SA3-25	11.057
151	ATM/SA5-25	11.057
152	ATM/SA7-25	11.057
153	MDA/STS/AM-3	11.288
154	SPAR/GRA-8	11.352
155	MDA/STS/AM-3	11.441
156	MDA/STS/AM-5	11.723
157	FAS/IU/OWS25	12.085
158	ATM/SA1-27	12.897
159	ATM/SA5-27	13.013
160	ATM/SA3-27	13.102
161	OWSNS27	13.130
162	MDA/STS/AM-8	13.185
163	ATM/SA1-27	13.412
164	MDA/STS/AM-7	13.479
165	OWSFS26	13.539
166	OWSNS26	13.602
167	OWSFS28	13.801
168	OWSNS28	13.820
169	CANISTER-6	14.084
170	CSMAX-10	14.280
171	CANISTER-7	14.543
172	MDA/STS/AM-8	14.602
	Frequency Cutoff 15 Hz	
		ĺ